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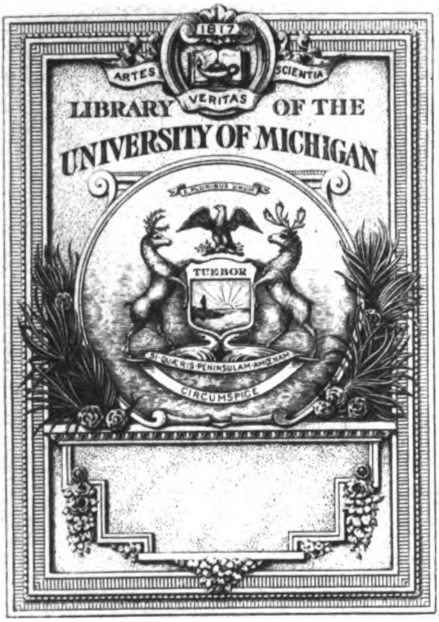

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TWENTY-FOURTH ANNUAL REPORT

OF THE

State Department of Health

OF

NEW YORK

For the Year Ending December 31, 1903

TRANSMITTED TO THE LEGISLATURE APRIL 6, 1904

ALBANY
OLIVER A. QUAYLE
State Legislative Printer
1904

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P. A. CALLEN, M. D	*Consulting ophthalmologist*

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STATE OF NEW YORK.

No. 67

IN ASSEMBLY,

April 6, 1904

TWENTY-FOURTH ANNUAL REPORT

OF THE

STATE DEPARTMENT OF HEALTH

NEW YORK STATE DEPARTMENT OF HEALTH

ALBANY, *April* 6, 1904

To Hon. BENJAMIN B. ODELL, JR., *Governor of the State of New York:*

Sir—I have the honor to transmit herewith the Twenty-fourth Annual Report of the State Department of Health, recording its work during the year 1903.

SANITARY CONDITION OF THE STATE

The most conspicuous feature of the sanitary condition of the State during 1903 was the epidemic of typhoid fever which prevailed to an alarming extent at Ithaca and at West Seneca near the city of Buffalo. The general features of the two localities were total antitheses of each other, the former being a city of beautiful surroundings, the seat of one of the great universities of the State with an intelligent, refined and comparatively wealthy population. West Seneca on the other hand was a recently established manufacturing village with a population composed almost entirely of laboring men and their families, with little knowledge of sanitary rules or other social requirements. In Ithaca, with a population of 13,000, over 500 cases were reported with 50 deaths. West Seneca had about 23 deaths out of 334 cases from a population of 4,000.

Health authorities everywhere are agreed in classifying typhoid fever among the preventable diseases. The duty of investigating the source of these epidemics being imposed upon the State Department of Health, steps were promptly taken to study the problem at both points, in which work the health authorities of Ithaca and Buffalo cooperated.

In both instances the distribution of the fever cases indicated the water supply as the purveyor of the infectious material, and repeated bacteriological and chemical analyses of the water, proved beyond a doubt the correctness of this view. In the one case a watershed from which the city supply was taken had not only not been protected by rules which this Department is empowered to enact, but also no inspection even had been made by the local authorities with a view to preventing the pollution of the water which was served by a private water company.

In the other case no system of drainage had been provided for a new and crowded community and the wells supplying water for domestic purposes became infected from this lack of drainage. One other typical case may be cited of a summer hotel where forty per cent of the inmates contracted typhoid fever from the well which was contaminated by a closet. Full reports of these outbreaks will be found in the appendix to this report.

There is evidence to prove that similar conditions to those above cited menace the public health of many municipalities of the State to-day, as well as numerous health resorts which are extensively patronized by citizens of many States besides New York.

THE PROBLEM OF PREVENTION

The Legislature of 1903 provided whatever authority was lacking to protect the waters of the State by the enactment of chapter 468, entitled "An act to amend the public health law, relative to the discharge of sewage and other refuse or other waste matter into the waters of this state."

Local health authorities have always possessed authority to enforce rules and regulations required for the protection of public health within their own municipalities. The State Department of Health is not only an adviser but an active force to aid the local authorities.

The only defect, and it is a fatal one, is the lack of funds for a systematic, thorough and constant supervision of water supplies, sewer systems and drainage to the end that dangerous conditions may be discovered and remedied *before deadly epidemics, like those already mentioned, occur.*

It requires no argument to prove that the paltry $2,000 a year which is available for such purposes is totally inadequate to meet these conditions, or accomplish to any appreciable extent the enforcement of the law enacted last year.

Your commissioner of health therefore urges the establishment of a new bureau of water supply and drainage in the health department, in accordance with the recommendation contained in your annual message, and has had a bill drawn and presented, appropriating $20,000 for the maintenance of such a bureau for the coming year.

Immediate action is necessary as a serious epidemic now in progress has already exhausted all the funds available for such work.

Ample powers are conferred by the Public Health Law to cope with these conditions, the services of sanitary engineers and inspectors are at hand for immediate employment, if the necessary funds are placed at our disposal.

Smallpox caused 41 deaths, of which 25 occurred in one locality, Rochester, where there was a considerable epidemic during the summer. After a continuance from the previous year into the early part of 1903, there was a period of subsidence during the summer in general distribution, but a recurrence in the fall. During the year there have been one or more places in thirty-one counties where smallpox has developed, and especially in Cattaraugus, Chautauqua, Delaware, Orleans, Niagara and Wayne counties. Special inspectors and the medical officers of the Department have been constantly at work to assist the local boards of health in managing their outbreaks. The type of the disease has continued. as for the last four years, exceedingly mild, and the number of cases has been far out of proportion to the mortality, although severe and fatal smallpox has developed from exposure to the mildest cases. The constant endeavor has been to secure the enforcement of the conservative laws of the State as to vaccination and where well carried out smallpox has been found to have but a short prevalence. Vaccination has proved the cheapest and most effective way of controlling what has often been a costly experience to the community and to individuals.

ANTITOXIN LABORATORY

The marked development of the work of the Antitoxin Laboratory while not unexpected, is nevertheless very gratifying. As will be seen by referring to the report of the director the demand for diphtheria antitoxin more than doubled the output for the previous nine months, which were the first months of the laboratory's distribution of the remedy. Every city except one in the State, and an average of nine municipalities or towns in every county outside of Greater New York, have been supplied, and regularly keep stocks of the antitoxin on hand for use when needed. In addition to the distribution to localities eight of the largest State charitable institutions and hospitals have directly drawn heavily upon the laboratories for supplies, and many of the smaller ones have received supplies indirectly through the local health officers. While this distribution will without doubt be extended somewhat in the near future, it can safely be said that never before have so many places in the State had diphtheria antitoxin available when needed, and as it is only when antitoxin can be administered early in the course of the disease that the best results can be obtained, the availability of the remedy constitutes one of the most valuable features of the system of State distribution.

This plan of enabling local health officers and heads of State and other institutions to attack the disease with antitoxin at the very outset not only saves the lives of many of the infected, but permits the accomplishment of even more good in the way of preventing the disease altogether. It is sadly true that municipalities and institutions, as well as individuals, will, as a general rule, continuously procrastinate to the last possible moment before making any decided efforts towards the prevention of outbreaks of infectious diseases. That it is one of the highest duties of the State represented by this Department, to assist and encourage in every possible way, and to even enforce the adoption of means and methods for the prevention of such disease, will not be seriously disputed. That the Antitoxin Laboratory amply assists the department and the State in this way it is only necessary to point as an example of its work, to the absolute stamping out of diphtheria in the Elmira State Reformatory during the latter part of the year by the use of immunizing doses of its antitoxin on nearly sixteen hundred of its inmates.

The educational effect upon the medical profession and the public of this and other such accomplishments along the lines of preventive medicine has already been manifested, and will become more general as the facts become more widely known.

Valuable work towards the prevention and even in the treatment of that terrible disease, tetanus, has also been accomplished during the past summer; the details of which appear in the director's record in the appendix.

Thus the laboratory performs a three fold purpose in saving lives, preventing disease, and in the education of the profession and public towards a prompt and more efficient prevention, and a better treatment of these infectious diseases.

BUREAU OF CHEMISTRY

Dr. Willis G. Tucker, in charge of the Bureau of Chemistry, has transmitted to me the following report of the chemical work of the department:

"During the past year the analysis of sixty-nine samples of food articles, the collection of which was referred to in the last annual report, has been completed, and fifty samples of water and various samples of miscellaneous articles have been examined. The foods included: Lager beer, two samples, of which one was adulterated; whiskey, eight samples, two adulterated; coffee, whole, eleven samples, none adulterated; canned tomatoes, five samples, none adulterated; mustard, seven samples, one adulterated; cream of tartar, seven samples, three adulterated; tomato catsup, nine samples, eight adulterated; extract of vanilla, nine samples, seven adulterated; chocolate, six samples, none adulterated; cocoa, five samples, none adulterated. Of the sixty-nine samples examined, therefore, twenty-two, or about thirty-two per cent were adulterated, but it is to be borne in mind that such articles only as were considered liable to adulteration or sophistication of some kind were collected for examination, and that had samples of food articles been indiscriminately collected the percentage of adulteration would have been very much less.

"The samples of water examined came from the following localities and were mostly received from local boards of health: Albion, Allegany, Angelica, Athens, Binghamton, Canajoharie (two samples), Canandaigua (seven samples), Cayuga Lake, Clifton Springs (two samples), Cohoes, Congers, Farmer, Grand Gorge (two samples), Highland Mills (two samples), Lexington (two samples), Middletown, Moravia, Newark, Newburgh (six samples), Peru, Rhinebeck, Rye (six samples), Seneca Lake, Trumansburg (two samples), Tupper Lake, Utica, Wellsville and Wyoming. Full reports on the analyses of all samples of foods and waters above referred to will be found in the report of the director. Three samples of sewage from the disposal plant at White Plains were examined in June and are elsewhere reported upon. Among the miscellaneous articles examined were samples of illuminating oils, extract of vanilla, and samples of cake and of corned beef thought to contain some poison or ptomain.

"Through lack of funds necessary for carrying on the work, no extended investigation of the food supply and of the quality of the drugs sold in the State has been possible, and for the same reason no examination of illuminating oils has been undertaken. Recent legislation has made the Department of Agriculture and the Board of Pharmacy jointly responsible with this Department in the supervision of the food and drug supply of the State, but the Department of Health is charged with the sole responsibility of enforcing the law regulating the sale of illuminating oils. Particular attention was called last year to the fact that an examination of a limited number of samples of kerosene oil collected in different parts of the State clearly indicated that considerable oil of inferior and very dangerous quality was being sold in violation of law, and the need of an appropriation to investigate the subject and deal with the matter properly and promptly was pointed out and strongly urged, but to no effect. It is again urged that not less than $2,500 be specially appropriated for this purpose, such sum to be used in the collection and examination of samples, the notification of dealers, and assistance in the prosecution of cases. There can be no doubt that many lives are lost and much property destroyed every year as a direct result of the use of low grade and dangerous oils, and attention is again emphatically called to the necessity of taking prompt action to prevent the sale of such oils within the borders of this State."

CANCER LABORATORY

The cancer research laboratory which the State has maintained at the University of Buffalo since 1899 has vigorously prosecuted its work during the year and undertaken new lines of study, especially in regard to the treatment of cancer. The following abstract from the report of Dr. Roswell Park, director of the laboratory, gives a general idea of the year's work:

"The past year has not been characterized by any marked discoveries which can be safely announced to the world, but has been marked by steady, earnest and even laborious study along the lines of investigation, all of which are necessary and all of which are lending improvement in the study of cancer, either by chemical or biological means.

"During the past year the staff of workers has included the following: Dr. Harvey R. Gaylord, pathologist; Dr. H. G. Matzinger, bacteriologist; Dr. G. H. A. Clowes, chemist; Dr. Gary N. Calkins, consulting biologist; F. S. Low, assistant in photo-chemistry; W. S. Frisbie, assistant chemist.

"A portion of this time has been spent by Dr. Gaylord in Europe; inasmuch as he is not working entirely in the interests of the laboratory, his salary is proportionately reduced. He has taken advantage of his presence in Europe to attend regularly the meetings of the Royal German Cancer Committee, of which, with myself, he is a member. He went to Copenhagen in the interests of the laboratory to investigate the work of Jensen on the transplantation of carcinoma in mice. Professor Jensen was kind enough to give Dr. Gaylord two of his mice, which were brought to the laboratory and used by Dr. Gaylord for the continuation and elaboration of the transplantation problem. A report from him is transmitted herewith. I also transmit herewith a paper by Prof. Gary Calkins, in which he has paved the way for still further announcements, of what importance, when made, there can be no doubt. Dr. Clowes has furnished a paper of great value concerning the chemical and bio-chemical aspects of the problem involved, a paper which sheds much light on the intricacies of the chemical research required.

"One feature with which our study is more and more influenced is the variation of tumors of apparently the same general type, which are found to vary more and more as do the personal features of different individuals of the same family. So marked is the variation that it becomes often confusing and makes it not only difficult to assign given specimens to their proper positions but even to indicate their relative degree of malignancy. Special attention has been given for the last few months to the study of tumor of the breast, in which Dr. Matzinger has been leader, and along which lines important theories have been advanced by Creighton in his remarkable new work entitled 'Cancers and Other Tumors of the Breast.'

"A part of the work undertaken by Dr. Clowes has been the chemical testing of the various staining fluids and materials in order to better appreciate their reaction upon the cells constituting tumors, a subject of which there is much yet to be learned which will prove of value.

"The study of cancer elsewhere provokes universal interest, evidences of which are seen in the increase of the activity of the medical journals devoted to this topic. A recent number of the British Medical Journal was almost exclusively devoted to the subject. There is now published in Germany, under the auspices of the German Commission for the Study of Cancer, a Zeitschrift für Krebsförschung devoted exclusively to the subject, of which three numbers have already appeared. It proves to be a journal of great value. Such widespread activity is manifested in these various ways as to indicate the importance of this study to humanity.

"In the last annual report I submitted a paper which had to do with applications, especially of the X-ray, in the treatment of cancer. In this paper I took the stand that it was too early to undertake to report results or do anything but gather material and watch. Now, a year later, I hardly feel justified in making any different statement, since, while a large amount of material has been gathered and while men have watched eagerly, reports are so confusing and results so variant that it is still difficult to form a judicial estimate of their actual value. Recurrence has taken place in but a few of the instances previously reported as cured, and the whole question is still *sub judice*. I have had it in mind to summarize in a similar manner the subject of radio-therapy, but here the same confusion prevails. Opinions regarding this subject are discrepant. It is usually those who favor the use of the treatment or those who have taken it up as a fad, who write the majority of the articles. Men who have been disappointed in its use, or who have never become converted to it, generally keep silent, and so their views are not heard.

"Treatment of superficial growth by liquid air constitutes a method much more tangible and in some instances, at least, promising. The conditions surrounding the method, however, make it impracticable.

"Herewith is submitted a table, arranged by months, of the deaths occurring from cancer in the State of New York, as taken from the monthly bulletin of the Department of Health. It shows an increase of about five hundred, that is to say, ten per cent over the total number the previous year. How this figure can be explained on any other basis other than actual increase, I cannot see. Certainly diagnostic methods have not so far improved within the year as to account for any such augmentation as this.

It constitutes a rather startling corroboration of the estimate and even the prophecy contained in my first annual report of five years ago. I do not know what stronger argument could be advanced in favor of public assistance for the study of this disease than these figures furnished by disinterested observers.

TABLE I

December, 1902	458
January, 1903	467
February	422
March	478
April	453
May	429
June	450
July	463
August	470
September	475
October	456
November	415
	5,436
For year ending December 1, 1902	4,984
Increase	452

BUREAU OF VITAL STATISTICS

The statistics of 1903 show a death rate of 17.6 per 1,000 population, and a birth rate of 21.8. With as accurate a registration of births as there is of deaths, no doubt the true birth rate would exceed 25 per 1,000 population.

The registration of births, deaths and marriages as reported for the year from the different registration districts in the State show an improvement over last year, and every effort is being put forth by the Department to bring the registration of births and marriages up to the standard of that of deaths, which is accepted as being nearly complete.

DELINQUENT REGISTRARS

That the local registrars of vital statistics have been more prompt in making their monthly reports to the Department during the year, is shown from the fact that during the year 1902 it was found necessary to send 2,506 "delinquent notices" to registrars, and that the average number of registrars failing to file their monthly report each month was 33, while for the year 1903, 2,056 "delinquent notices" were mailed local registrars, with but an average of 26 failing to report each month.

There are several "chronic" delinquents who seem to persist in ignoring the State health laws and the rules of the Department covering the registration of vital statistics, and it appears that the only remedy to compel complete registration from these districts would be an amendment to the Public Health Law requiring the appointment of health officers as the registrars of vital statistics, or making the municipality bear all expenses incurred in sending a representative of the Department to take charge of the registration until satisfied that the municipal authorities would make the registration complete and forward the certificates promptly to the State Department of Health on the first of each month.

DEFECTIVE CERTIFICATES

During the year there were returned for correction 1,248 defective certificates. The new form of certificate adopted by the Department last year for the registration of vital statistics has been the means of getting a more complete record for statistical purposes, and that an improvement has been made during the year in getting better records of the births, deaths and marriages occurring in the State is shown from the fact that while more certificates have been filed in the Department, there were less defective certificates received than in the previous year, when 1,365 were returned for correction.

TRANSCRIPTS

During the year there were 390 written requests for transcripts of certificates received, to be used for legal and administrative purposes, and many verbal requests were made for the same purpose.

The condition of the work in the Bureau is satisfactory. During the year there were indexed and properly filed for safe keeping 89,067 birth certificates, 48,976 death certificates and 21,276 marriage certificates, and 198,653 cards were added to the index system. In addition to the above, all delayed certificates received during the year were indexed and properly filed in their respective years.

BACTERIOLOGICAL WORK

The plan of making cultures in diphtheria cases for purposes of diagnosis as well as for determining when quarantine may be raised, has vastly increased during the past year; the same is true of the application of the Widal test in suspected cases of typhoid fever. It should be borne in mind that of some 1,400 municipalities of the State, less than a dozen provide laboratories for their health officers. The State Department of Health therefore supplies nearly all local boards of health in the State with these facilities which are now an *absolute necessity* in public health work.

For the present all bacteriological examinations of samples of water are also made by this bureau; the demands for these examinations are increasing with such rapidity as to tax the staff of the laboratory to the uttermost. Relief from this condition can be secured however if the new bureau of water supply and drainage shall be established by the Legislature as previously recommended.

The growth of the work of the laboratory above referred to may be seen at a glance by referring to the report of the Director to be found in the appendix, which covers the work of two years and eight months, dating from the establishment of the laboratory.

EXAMINATION OF EYESIGHT OF SCHOOL CHILDREN

Dr. P. A. Callan was appointed consulting opthalmologist by the Department, September 29, 1897, and he presented a plan for testing the eyesight of school children; children whose vision proved defective beyond a certain degree were to be furnished with a printed request to the parents to have the children taken to a physician for treatment or more thorough examination and treatment.

A comparatively small number of school principals availed themselves of the offer of the Department to furnish them with test types and all necessary appliances for these examinations. During the past year, however, the Superintendent of Public Instruction has deemed the matter of sufficient importance to issue an official recommendation to the school authorities of the State, recommending a systematic application of these tests. From the small number of reports of examinations received from principals of schools 14.1 per cent were shown to have defective vision. These results demonstrate the great importance of this branch of our work and should be a powerful argument in favor of eye examination in all of the schools of the State.

RULES FOR THE PROTECTION OF WATER SUPPLIES

It has been gratifying to note the general public interest of the various municipalities in the proper protection of the sources of their water supplies from contamination. At present 50 cities and villages have availed themselves of the provisions of the Public Health Law and have ample means for protecting their watersheds under rules enacted by this Department.

Rules were provided for the following municipalities during the past year:

Cold Spring.
Central Valley.
Spring Valley.
Ithaca.
Middletown.

If this Department were fully equipped, as heretofore suggested, to aid the local authorities in the enforcement of these sanitary rules, the outbreak of epidemics due to impure water would soon cease to occur in the State.

Cases of alleged noncompliance with such rules were investigated by the engineers of this Department on the Croton watershed alone, nearly all of which were reported to the health department of New York city for prosecution.

SEWER SYSTEMS APPROVED

The law (chapter 375, Laws of 1889) makes it the duty of this Department to examine and approve sewer plans of villages, and chapter 468 of the Laws of 1903 extends the duty of such approval to any increased discharge of sewage from existing city sewer systems.

Two hundred and forty-five municipalities now have sewer systems approved under these laws. The following have been examined and approved during the past year:

Alexandria Bay.
Black River.
Brockport (sewage disposal).
Canajoharie (sewers).
Corinth (sewers).
Fort Edward.
Lake Placid (sewage disposal).
Larchmont Park (sewers).
Lestershire (sewers).
Matteawan (sewers).
Norwood (sewers).
Penn Yan (sewers).
Port Chester (sewers).
Raybrook Hospital (sewage disposal).
Saranac Lake.
Skaneateles.
Weedsport.

The increasing demand for sewer systems is apparent from the fact that nearly eight per cent of the entire number passed upon in the past fifteen years were submitted during 1903.

Plans for some method of sewage purification are now required in all cases. As in the case of water rules, so in the construction and operation of sewer systems the State Department of Health should continuously exercise a vigilant inspection during construction and the subsequent operation of these sewers, and especially of the disposal works, as the purification of the waters of the State must depend upon the continuous efficiency of these works.

CAYUGA LAKE

During the summer of 1903, Dr. George A. Soper, who was then representing the State Department of Health, made an extended examination of the advisability of controlling the level of Cayuga lake, believing that high stages of the lake cause floods which produce malarial fever and other diseases, while low stages make the lake too shallow for navigation. This needed control of the lake level is of especial importance to the city of Ithaca.

A tentative plan for the control of the lake at normal level has been formulated by Dr. Soper, whose full report with illustrative drawings are herewith transmitted.

ABATEMENT OF NUISANCES

Many reports of alleged nuisances continue to be received which should be abated by the local authorities. The proper function of the State Department is to investigate and order action in any case where the local board *has failed to take the proper action* for abating the nuisance.

A leading feature of the Annual Conference of sanitary officers has been to give instruction to health officers as to the proper method of dealing with these complaints.

The Attorney-General has formulated and presented valuable contributions to the Conference upon the legal questions involved in these cases.

INVESTIGATIONS ORDERED BY THE GOVERNOR

These investigations are made under section 6, article I of the Public Health Law and differ from ordinary investigations in the provision that "the report of every such examination, when approved by the Governor, shall be filed in the office of the Secretary of State, and the Governor may declare the matters public nuisances, which may be found and certified in any such report to be nuisances, and may order them to be changed, abated or removed as he may direct. Every such order shall be presumptive evidence of the existence of such nuisance; and the Governor may, by a precept under his hand and official seal, require the district attorney, sheriff and other officers of the county where such nuisance is maintained, to take all necessary measures to execute such order and cause it to be obeyed, and the acts of any such county officer in the abatement of any such nuisance, reasonable or necessary for such abatement, shall be lawful and justifiable and the order of the Governor a sufficient protection to such officer. The expense of such abatement shall be paid by the municipality where the nuisance occurs, and shall be a debt recoverable by such municipality of all persons, maintaining it or assisting in its maintenance, and a lien and charge upon the lands upon which the nuisance is maintained, which may be enforced by a sale of such lands to satisfy the same."

The most important investigation ordered by the Governor during the year was the alleged pollution of Lake Champlain by the pulp mills located upon some of the tributaries of the lake. The examination has required a vast amount of labor, including the microscopical and bacteriological examination of a large number of samples of the sludge from the beds of the streams and the contiguous parts of the lake beds.

The question for the department to decide is plainly whether the existing conditions constitute a nuisance, dangerous to the life and health of the residents of the locality. It is expected that the reports from the engineers and other investigators will be complete at an early date and forwarded to you in accordance with the terms of your order.

In concluding this summary of the work of the department permit me to briefly refer to the economic features of public sanitation.

The contagious and infectious diseases are to a great degree preventable. The loss of life attending epidemics is the chief penalty which a community or a State pays for the neglect of proper sanitary precautions and control.

During the year 1903 five preventable diseases cost the State the following loss of life:

Pulmonary tuberculosis	13,194
Diphtheria	3,056
Typhoid fever	1,665
Scarlet fever	1,057
Smallpox	41
Total	18,992

If the monetary value of a human life is assumed to be $5,000, these deaths represent a loss of $94,960,000. These figures seem appalling, and yet millions upon millions can properly be added to this sum, in loss of wages, expense of the care of the sick and many other expenses incidental to the management of these epidemic and infectious diseases.

It is the manifest function of the State to employ every resource known to medical science to prevent the outbreak of these diseases and to limit their ravages as far as possible when they occur.

The appropriations for this purpose should be limited only by our power to judicially disburse the funds appropriated. A million dollars could be thus used every year to the enormous advantage of the people of the State.

Respectfully submitted,
DANIEL LEWIS
State Commissioner of Health

APPENDIX

TWENTY-FOURTH ANNUAL REPORT

OF THE

State Department of Health

Financial Report, Disbursements from October 1, 1902 to October 1, 1903

Salaries	$20,400 00
Bureau of Pathology and Bacteriology	1,356 68
Office expenses	5,988 53
Traveling expenses	1,951 87
Investigations	3,705 17
Cancer laboratory	13,760 57
Antitoxin laboratory	11,857 41
Postage and expressage	1,350 00
Smallpox epidemics	3,750 54
Smallpox (town of Altamont)	225 46
	$64,346 23

PLANS

FOR

SYSTEMS OF SEWERAGE

AND

SEWAGE DISPOSAL

APPROVED DURING 1903

ALEXANDRIA BAY

Original plans for a system of sewers for the village of Alexandria Bay were approved by the State Commissioner of Health on March 14, 1903, subject to the condition that disposal works would be constructed when called for by the State Commissioner of Health.

These plans comprise:

A report of the designing engineer herewith appended.

Specifications for the construction of the sewer system, not including disposal works, on file but not published herein.

A contoured sewer map of Alexandria Bay published as Plate I of this report.

Nineteen sheets of sewer profiles, bound together, filed but not published.

Hon. Daniel Lewis, *Commissioner of the Board of Health,*
Albany, N. Y.:

Dear Sir—I herewith submit for your consideration a report in duplicate for a system of sewers for the village of Alexandria Bay, county of Jefferson and State of New York.

The village of Alexandria Bay is situated on the south side of the St. Lawrence river, containing about 200 acres of land, about one-half being drained naturally into what is known as Green's creek. It has a population of about 1700 in the winter season, with perhaps double that amount during the summer months.

From the reports of the United States Weather Bureau, extending back about four years, we have observations at Watertown, 25 miles due south, and at North Hammond, about 15 miles northeast of Alexandria Bay. From their daily reports we find one day, March 11, 1901, when the daily precipitation was 2.75 inches; this precipitation was at North Hammond, the gauge registering only 1.07 inches at Watertown for that date. There were four days when the precipitation amounted to two inches, seven days when the precipitation amounted to one and one-half inches, sixteen days when the precipitation amounted to one inch. and thirty-nine days when the precipitation amounted to one-half an inch.

The plan involves two different districts—one which I will call District No. 1, or the James street district. The section which will be drained by this system consists of James street, Fuller street, Market street and Church street, extending southerly as far as Rock street; also the westerly portion of Rock street and the westerly portion of Walton street. It also includes Bethune street, Crossman street and Rockwell street.

There is also a sewer draining the houses along Sisson street, discharging into the upper end of James street sewer. The last sewer, partly across private property, is made necessary on account of the heavy rock excavation which would be necessary to continue it around through Fuller and Market streets. Also another short branch crosses this property, leading from Fuller street to the Thousand Island House kitchen, from there connecting into the Sisson street sewer.

This system is marked on the map with a full black line; manholes are shown with two circular black lines, and lampholes with a black cross.

The proposed sizes of the sewer pipe are indicated in black figures.

District No. 2 comprises the remainder of the village, and will find its most convenient outlet along the creek which discharges below Bonnie Castle point. In this district is included the southerly portion of Church street, the westerly portion of Bolton street, the easterly part of Rock street and of William street, also Holland street, Second street, Anthony street, High street and Cornwall street. The southerly portion of Church street finds its outlet easterly through the low ground, where at some future time there will probably be a street extended easterly and northerly to a point on Walton street near the bridge, where the present brook crosses, the discharge from this system following down in the vicinity of Green's creek.

It is designed to make this outlet of 15-inch and 18-inch cast-iron pipe, extending out through the outlet of the creek to a point where the outlet is sufficiently deep, with a positive downstream current. The pipe will be provided with a gate valve and hose inlet.

In the James street district the sizes of pipe are designed to carry the entire quantity of sewage and rainfall. In district No. 2 the sewers will carry all the sewage and a portion only of the entire rainfall. To accomplish this latter arrangement the catch-basins will be provided with sewer inlets of only sufficient size to permit such quantities of storm-water to enter them as they will be able to carry; the remainder of the storm-water, in time of heavy storms or melting snow, will be carried off from the catch-basins with storm-water overflows placed a little higher up and made of a size sufficient to take away all the remainder of the water, allowing it to flow down the valley or into the nearest watercourse.

In the design of the systems it will be necessary to use in the iron pipe, gates and valves of the ordinary waterworks pattern, and also to provide hose connections at points outside of the gates so that the fire hose may be attached to the nearest hydrant and the pipes flushed out by means of a pressure thus obtained from the water system. Gate and hose inlet are designated on plans.

Accompanying this report will also be found plans, specifications and a table showing the area to be drained, different sizes of pipe, the quantity of sewage, and also the quantity of stormwater that the systems are designed to carry.

Yours very truly,

FRANK A. HINDS, C. E.

WATERTOWN, N. Y., March 3, 1903.

BLACK RIVER

Original plans for a system of sewers were approved by the State Commissioner of Health on February 17, 1903.

The plans comprise:

A contoured sewer map of the village of Black River, forming Plate II.

Two sheets of sewer profiles, on file but not published in this report.

Three sheets of manhole details, on file but not published in this report.

Report of designing engineer dated December 2, 1902, followed by a statement concerning the disposal works, hereto appended.

Detail estimate of cost of the sewer system, on file but not published.

REPORT

CARTHAGE, N. Y., *December* 2, 1902

To the President and Trustees of the Village of Black River, N. Y.:

Gentlemen—Enclosed we are sending estimate, maps and profiles of a system of sewerage for your village.

The village has now a population of about 1200, with good prospects of increasing rapidly. This population at present is scattered out on a few long streets, with large spaces of ground lying between, admirably situated for laying out the village lots. It is therefore to be presumed that by the time the village has increased to 2500 it will not extend much farther out than at present, but the houses will be closer together and some of the unoccupied lands will be laid out and built up. On this assumption I have figured on one house to 50 feet of street front each side, or a population of 20 persons per 100 feet of street, and have designed the system for 2000 gallons of sewage for 100 feet of street; 1200 gallons for streets now occupied, and 800 gallons for tributary streets which may be hereafter laid out, and for a run-off in 8 hours.

At your request I have not planned sewers to drain cellars as there is no complaint, and the town laying comparatively high and being of sand, no great need for such should occur.

The most feasible disposal is into Black river, which is very rapid at all points considered, or into the Tunnel. Whenever the water in the river is as high as the top of the dam, there is a good body of water passing underground from a point in rear of the schoolhouse, coming to the surface in rear of the depot for a distance of about 300 feet, and finally appearing at the head of Tunnel bay, above the dam of the Remington Pulp Co.

DISPOSAL

The contours and layout of your streets show that there must be four outlets into Black river to properly sewer the village until such time as disposal works may become necessary. This divides into four systems, each of which will be described separately.

NORTH SIDE SEWER

All that portion of the village laying on the south side of the river may be sewered through Le Ray, Main, Maple or Mechanic streets and to the outlet near the bridge. The village is now strung out over the first three streets for quite a distance. An increase of double the population, taking into consideration the prospects of the vacant land between the streets being laid off into village lots, would probably not extend out much farther than at present.

HUNTINGTON STREET SEWER

All that portion of the village lying on the schoolhouse hill and two-thirds of West street can best be sewered through Huntington street, emptying in the head of Tunnel bay. There is on either side of Huntington street some vacant land, which, if laid out into village lots, could be sewered through this street. Huntington street is not thickly settled at present, but I have made allowance, as in all other portions, for one house of five people per 50 feet front.

FACTORY PLACE SEWER

A portion of Main street, together with Factory place, can best be sewered by placing an outlet into the tail-race of the Yellow mill, opposite West street. A portion of West street can also be connected with this system.

SOUTH MAIN STREET SEWER

To sewer that portion of South Main street lying south of the Rutland street corner it is necessary to take advantage of the underground stream. In order to not cause any nuisance by cessation of flow of this stream, due to the lowering of the mill pond in the river at times, it is necessary that the outlet be as near the point where the water enters the ground the last time as possible.

On account of the sewer being so near the surface of the ground and the ease in uncovering, if necessity should demand, I have placed the manholes mainly at the angles and intersections of the streets and at the break of grade.

I have omitted automatic flush tanks, placing in their stead a manhole at each end, from which they may be flushed from a near-by hydrant.

DISPOSAL WORKS

It is proposed to install a disposal works as indicated on the plans consisting of a series of three septic tanks of sufficient capacity to properly treat the sewage.

Only one of said tanks to be installed at present, but it will be constructed in such manner that it can be enlarged as found necessary.

Plans and specifications to be subject to the approval of the State Health Commissioner.

EATON & BROWNELL
Per JAMES P. BROWNELL

BROCKPORT

Amended sewage disposal plans

Plans for a system of sewers and sewage disposal were approved by the State Commissioner of Health on May 14, 1901, and appear in the twenty-second annual report.

Plans for a different system of sewage disposal to replace those originally approved were approved by the State Commissioner of Health on October 20, 1903, subject to the condition that changes or modifications in the disposal works may be required when, in the judgment of the State Commissioner of Health, they may be necessary.

The plans comprise:

General plan and filter details, forming Plate III of this report.

Drawing of septic tank, forming Plate IV of this report.

Drawing of distributing apparatus details, forming Plate V of this report.

CANAJOHARIE

Amended sewer plans

Plans for a separate sewer system and disposal works were approved by the State Board of Health on February 14, 1900, and appear in the twenty-first annual report.

Plans for an amended street sewer system were approved by the State Commissioner of Health on January 15, 1903, and comprise:

A contoured sewer map of the village, forming Plate VI of this report.

A sheet of sewer profiles, forming Plate VII of this report.

A report on the amended system prepared by the designing engineer, dated November 24, 1902, and hereto appended.

CANAJOHARIE SEWERS

The village of Canajoharie lies on the south side of the Mohawk river, covers an area of about one and one-half square miles, and has a population of about 2300 people. A portion of the village lies on the low flat land, but the larger part of the area is on steep hills which slope toward the river and Bowman's creek, which divides the village into two nearly equal areas. The hills are of limestone and slate rock, and rise to an elevation of 250 feet above the river.

Surface water is well cared for at present by tile sewers and stone drains and culverts. The following streets have either pipe sewers or stone drains for surface water: Church street, between Cliff street and the Erie canal; West Main street, Michigan street, a part of Mohawk and Cliff streets, also a part of Robinson, Montgomery, Rock and Front streets. These drains flow into the creek or under the canal to the river.

GLOVERSVILLE, N. Y., *November* 24, 1902

To the Honorable Board of Trustees of the Village of Canajoharie:

Gentlemen—I herewith submit plans for a complete separate system of sewers for the village of Canajoharie to amend the plans submitted by Mr. F. E. Crane in 1899, which are now on file in the office of the village clerk and appear in the twenty-first annual report of the State Board of Health (page 35).

The plans consist of contour maps of the village, in duplicate, showing the location of all manholes, flushtanks, lampholes and pipe lines; the direction of flow, sizes and amended grades of pipe lines. Where no changes of grade are made, no profiles are submitted as the grades, specifications and detail plans approved by the State Board of Health on the 14th of February, 1900, are to be used without change.

The changes in the plans are the following: The main outlet into the Mohawk river is changed from a point above Bowman's creek to a point about 700 feet below the junction of the creek with the river. Instead of three separate outlets the entire sewage is brought to one outlet, no sewage is emptied into the creek and the 15-inch inverted syphon under the creek is eliminated. The sewage is brought to one point, below the village, for final disposal when the construction of purification works becomes necessary; also the location for disposal is better, being farther from the village proper, and odors that might arise from septic treatment or intermittent filter beds would not reach the village. Since the first plans were submitted a water system has been constructed in the village. The source of supply is a well about 30 feet deep and 20 feet in diameter sunk in the river flats about 70 feet west of the creek and 200 feet south of the river. The well is in a coarse gravel soil, several feet in depth below the bottom of the river and creek beds. Hence it is desirable to change the location of the two outlets from a point above the wells to a point below, or on the downstream side, to avoid any possibility of polluting the village water supply with sewage. The other changes were in sizes of pipe, and in the grade on Main street as shown on profiles accompanying plans.

The reasons for the changes in sizes of pipe are several: The streets of the village are well drained, and many of the roofs are connected with these storm sewers and drains and more can be connected if at any time the sewers should become burdened. The large quantity of rock in the village would prohibit universal connecting of roofs to the sewers because of the heavy expense entailed. The percentage of roofs connected with city and village sewer systems is small. This is particularly true of the smaller cities and villages. In some of the cities of medium size less than 15 per cent of all of the roofs are connected with the sewers, where there are no restrictions against roof connections and the buildings are new and modern. Roof-water should be kept at a minimum in any sewer system contemplating disposal by any process other than dilution. Portions of many streets will never be available for building purposes, due in part to rocky ledges and very irregular topography of the village, and to a railroad along the entire length of two streets, a creek along one side of another street, a stone wall from 20 to 50 feet high along one side of another street, and high ledges of rock along others, making it impossible to build along one side of those streets, hence there will be less than the average number of connections in Canajoharie, for the length of sewer, than in other villages of its size.

In view of the facts that the storm-water in the village is well cared for, and of the large amount of rock to be encountered in constructing a sewer system, and also that ultimate purification of the sewage is contemplated, a separate system of sewers recommends itself.

I have assumed that the maximum discharge of sewage will be 100 gallons per capita in twelve hours, and have allowed between five and six persons on each available lot of 50 feet frontage. I have assumed the rainfall per hour as one inch, and that in the outlying districts one in five roofs of 1000 square feet area will be connected so that a part of the roof-water will reach the sewer. In the business section, I have assumed that one-half of the roof area will be connected with the sewers. Several roofs are connected with the storm sewers in the streets. I believe that these ratios for roof-water are in excess of what will ever be connected.

The pipes are, in general, to flow about half full, although on the steep grades they are larger than the flow requires, but pipes smaller than eight inches in diameter are liable to clog, and the little difference in cost has not been considered sufficient to offset this risk.

The specifications, detail plans of manholes, lampholes, flush tanks and other fixtures, as approved by the State Board of Health in 1900, are to be used without change. Clauses referring to labor laws since that date will be added to the contract.

I have estimated the cost of a complete system of sewers for the entire village at $44,000. This estimate includes several lines at the ends of streets and some lines on streets that will not need sewers for some time.

All of the principal streets, making up the greater part of the village, or about five miles, can be sewered for $36,000, which will meet present requirements.

Respectfully submitted.

MORRELL VROOMAN
Civil Engineer

Office of New York State Department of Health, Albany, January 15, 1903.

CORINTH

Original sewer plans

Plans for a separate system of sewers and sewage disposal were approved by the State Commissioner of Health on March 11, 1903. These comprise:

A contoured sewer map of the village, forming Plate VIII of this report.

Three sheets of sewer profiles, on file but not published.

A sheet of sewer details, on file but not published.

A drawing of the sewage disposal system, forming Plate IX of this report.

A report of the designing engineer, dated January 24, 1903, hereto appended.

A set of specifications, on file but not published.

Saratoga Springs, N. Y., *January* 24, 1903

Hon. Daniel Lewis M. D., *Commissioner State Department of Health, Albany, N. Y.:*

Dear Sir—The village of Corinth, N. Y., having voted to raise $25,000 for the purpose of constructing a sewerage system, the board of trustees have employed me to prepare plans for the construction of the said system, which I herewith submit.

The village has a population of 2100 people, and is spread over quite a large area for so few people; therefore the sewers are designed a great deal larger than the present demands, but as the village is growing and new enterprises being started all the time, it is fair to assume that in time the village will have a population of 5000.

The system designed is intended for the separate system, but it is likely that in a few cases, such as at the juncture of Palmer avenue and Sixth street and Palmer avenue and Fifth street, and on the lower ends of Oak and Walnut streets, it might be necessary to place some catch-basins until such time as the storm-water carriers are constructed.

The separate system was recommended in case of future purification of the sewage, and as the village did not feel that it could stand the expense of both the sanitary and storm-water systems, it was determined to construct only the sanitary system now and enlarge a portion of the pipe at the lower ends sufficient to answer any necessity that may rise before the storm-water system is constructed.

The watershed of the village of Corinth flows into the Hudson river, and the system proposed is to be in two sections: the one having its outlet into the Hudson river below the mills of the International Paper Company and comprising that portion of the village known as Palmer Falls, and the other outlet discharges into the Hudson river at River street. These two sections of the village are separated by a natural divide, necessitating the carrying of the sewage east of this summit to the Hudson river below the International Paper Company's mills, and that portion west of the summit to a point in the Hudson river at River street.

In the section east of the summit the streets shown on the map as Beech, Sycamore, Ash, Gobel avenue and Hill avenue have had no levels taken for profile, as the streets are not yet laid out but only mapped.

These streets having been taken into consideration in the plans, a great deal of grading will have to be done on these streets before they are in a condition to travel on, and therefore the grading will determine the location and elevation of any sewers on them.

The bank of the Hudson river lying between the bridge at the end of Sherman avenue to the mills of the International Paper Company is a perpendicular ledge, except at Indian Hollow.

The property lying east of the east line of the corporation, which will some time be annexed to the corporation, has been provided for by the Lower Pine street and Palmer avenue sewers.

The portion lying one tier of lots north of Palmer avenue is land used by the International Paper Company as a piling ground, and therefore no plans have been made for this portion of the village.

The outlet of that portion discharging through Sixth street discharges about 50 feet from the bank of the river.

At this point the current of the river is very rapid, insuring a perfectly sanitary condition.

That section west of the summit which has its discharge west of River street is designed to carry the pipe out into the river about 60 feet to a point where the water begins to descend rapidly over a series of reefs. In order to do this a secure and firm foundation for the pipe to prevent it from being disturbed by the spring freshets, logs, etc., will be necessary. A portion of the river bed will have to be blasted out, which can be easily done in the summer when the water is low. That portion of the village west of the terminus of the Hamilton avenue sewer cannot come in under the present system, as any drainage of this portion will have to be made along the valley of the brook draining that section. This land is now used for farming purposes and has not been laid out in streets, therefore it is not deemed necessary to embody this portion in the present plan.

About two years ago a portion of the system was built by private subscription. This portion was along River street, and Main street from River street to Maple street, and Maple from Main to Mill streets, and along Center from Maple to Mechanic streets.

This portion it is intended to use, except River street, which will be enlarged to 15-inch pipe and lowered about two feet to allow the sewage from Hamilton avenue and its laterals to be taken in.

The sewage from Hamilton avenue, Mallery street and that part of the village could have been carried along the valley of the brook to the river at less expense, but the current of the river at that point is very sluggish and there was danger of creating an unsanitary condition there at low water. The portion of the village lying west of Center street not yet being divided up into streets was not considered only in a general way. Eventually this portion will have to be carried along some street constructed in the valley of the brook or on private land to connect with the Hamilton avenue or Mill street sewer.

The material here is a hardpan and boulders with some solid rock, making it expensive excavating, therefore the sewers have been designed for as light excavation as possible, and still drain any cellars that are bothered at all with water, at the same time giving a system that will do for all time.

There are practically no inhabitants along the Hudson river from Corinth to Glens Falls, and as the distance is about 10 or 12 miles of very rapid water, there is no fear of any pollution of the waters of the river. The amount of sewage to be disposed of is hard to determine, but from the present water supply it was estimated at about 185,000 gallons per day. This will be increased quite materially as the village grows.

Upon the suggestion of Prof. Olin H. Landreth, engineer of the State Department of Health, that some degree of purification would be required at this time before discharging the sewage into the river, with provisions for further purification in the future if deemed necessary, I have prepared plans for a septic tank at each point of discharge, which I herewith submit.

The tank at the River street outlet will necessarily be so located that it will be impossible to discharge the effluent from the septic tank onto either contact beds or filters without pumping.

This, however, can be done by constructing a receiving tank for the effluent of the septic tank and the sewage pumped from there to the filters. This tank will be located on the easterly side of Main street, between River street and the river, as all sewage discharging into the River street outlet, as shown on the plans, can be brought to it.

The Sixth street outlet will be located near the river at a point below the railroad at an elevation sufficient to allow a flow to either contact filters or beds, and if possible to take the sewage from the International Pulp and Paper Company's mill.

The tanks are so designed that in times of high water sewage will pass around the tanks in the by-pass, and the tanks be protected by the flap-gate at the outlet and the screw-gate at the inlet.

This high-water occurs only in the spring and lasts but a few days, when the lower streets of the town are under water.

This precaution against flooding will not be necessary on the Sixth street outlet, as the tank and its outlet will be above high-water mark in the river.

The tanks are provided with an overflow in case of any stoppage in the tank. This overflow connects with the by-pass and flows direct into the outlet.

The placing of the weir at the outlet is for the purpose of gauging the amount of flow and to determine the time occupied by the sewage in passing through the tank, and also to afford opportunity to examine the effluent.

The draining gate is at the elevation of the inlet; this will permit of the sewage being drawn off to that level and the sludge deposit pumped out. The tanks are planned to each care for 9000 cubic feet of sewage in twenty-four hours; this is based on a flow of 60 gallons per capita per day of the present population. This will subject the sewage passing through the tank to a twelve-hour treatment. The tanks at any time may be enlarged by building additional tanks at the farther side and connecting with the present inlet gate chamber.

The by-pass shown on the plans does not entirely drain the receiving chamber, 'as this is not possible at the River street outlet on account of the elevation of the surface of the water in the river.

At the Sixth street outlet this difficulty is overcome, and the by-pass invert is at the elevation of the bottom of the receiving chamber.

The question of further purification lies in one of two systems; contact filters or contact beds.

There is no material suitable for intermittent sand filtration, the earth in that section being, as before stated, composed of coarse gravel, boulders and hardpan.

The construction of contact filters or beds being the most economical, as cinders or clinkers from the mill can be obtained at low cost.

I have not gone further into the question of filtration at this time, as there are so many new developments along the line that there may be some one of which we may be able to take advantage, but in any event further purification can be obtained as above stated.

Respectfully submitted.

S. J. MOTT
Engineer

CUBA

Original sewer plans

Plans for a separate system of sewers and sewage disposal for the village of Cuba were approved by the State Commissioner of Health on February 27, 1903, and comprise:

A contoured sewer map of the village, forming Plate X of this report.

Five sheets of sewer profiles with an index sheet bound together, on file but not published.

Two drawings of disposal plant, forming Plates XI and XII of this report.

A report of the designing engineer, including estimate of cost and list of bench-marks, hereto appended.

Contract, specifications, notice to bidders, form of proposal and preliminary bond, on file but not published.

REPORT OF THE DESIGNING ENGINEER GIVING DESCRIPTIONS, DATA, ESTIMATES, LIST OF BENCH-MARKS, ETC.

ENGINEERING SCHOOL OF UNION COLLEGE
SCHENECTADY, N. Y., *November* 1, 1902

To the Board of Trustees, Village of Cuba, N. Y.:

Gentlemen—I beg to submit the following report on the design of the system of sewers which I have prepared for your village in accordance with the arrangement made with your honorable board by correspondence of July 9 and August 23, 1902. For a partial description of the conditions in your village, as they relate to sewerage, I beg to refer you to my previous two reports on this subject dated July 4 and July 19, 1902, respectively, the points in which I shall not therefore repeat here.

CHARACTER OF SYSTEM DESIGNATED

All conditions here point to the suitability of the "Separate" system of sewerage, which has therefore been adopted. No storm-water is provided for in the sewers, nor roof-water, nor any more ground-water than it is possible to avoid leaking into the joints, which are to be made as impervious as possible. But a system of ground-water drains is provided for, which are to be laid along most of the sewers and in the same trench with the sewers proper, but which are designed to discharge, not through the disposal works, but directly into the nearest convenient point of the creek, viz, at or near the Water street bridge.

AMOUNT OF SEWAGE PROVIDED FOR

In adopting the sizes of sewers the assumption has been made that ultimately each street will have a residence or place of business on every 50-foot lot on each side of the street, and that every such building will have, on the average, four persons, each of whom will consume or use 100 gallons of water per day, or at least will contribute that amount of sewage to the system. It is also assumed that, since the production of sewage will not be uniform through the twenty-four hours, the rate of discharge during the time of maximum flow will be double the average flow, and the sewers have been adopted large enough to carry this amount when flowing only half full, beside an amount of leakage from ground-water, unavoidable to prevent, amounting to about one-fourth of the above amount of sewage. The above represents the discharge of sewage from an assumed future population of 7300 people, and a discharge of 730,000 gallons of sewage per day, besides 178,000 gallons of ground-water per day in the sewers proper in addition to the much larger amount flowing in the regular ground-water drains. The above represents the amount of sewage provided for in the collection system or sewer pipes. For the disposal works, however, only 200,000 gallons of sewage per day has been provided for, which represents 100 gallons per day from a population of 2000 people. When the village reaches this population the disposal works may readily be increased in size without sacrifice of any considerable part of the present proposed plant, while the street sewers could not readily be enlarged without sacrificing the whole of the existing sewers.

GROUND WATER PROVIDED FOR

The system of tile drains which have been provided, and which are shown on the table of "Estimate of Cost" in both length and diameter, will discharge 690,000 gallons per day of ground-water in addition to the 178,000 gallons leaking into the regular sewers, making a total discharge of 868,000 gallons or 116,000 cubic feet of ground water discharged per day as the flowing capacity of the two systems. The sizes of drain tile range from 4-inch to 12-inch and aggregate 30,052 linear feet in all, being about two-thirds the total length of the sewers proper, which are 45,631 linear feet in length. When it is understood that relatively a small part of the rainfall penetrates to the depth of the ordinary sewers, and that the drains are flowing continually during the twenty-four hours, it will be appreciated that the drains will have a very marked effect in lowering the plane of ground-water, which is one of the important functions to be secured. A wet subsoil does not necessarily mean that a large amount of water is *flowing* under ground: it is rather suggestive evidence that the water is standing rather than flowing. The flatness of slope and the character of soil at Cuba indicate that this is the probable condition. It can only be otherwise where decided streams or bodies of underground water are moving toward and through the wet district, which appear hardly to be the case at Cuba. Should this be the case, which can only be determined by the opening of the deep-sewer trenches in the upper or southern part of the village, the proper relief would be to lay a line of intercepting drains across the line of flow of such underground streams or bodies of ground-water and conduct the water to the nearest stream or creek available. This would be less expensive than to carry such water through the entire system of drains to the Water street bridge over Oil creek, as that would necessitate large pipe for the entire distance.

Particular attention has been given to the localities where the ground is known to be wet, and the sewers have been placed low and the drain pipes large in these places, so that it is believed that the system as planned will provide amply for ground-drainage. Should it not do so, however, from unexpected bodies of ground-water moving toward Cuba from the south, the above remedy as indicated can be applied without sacrifice of any part of the work done, and at an expense less than that to have made the piping system large enough at the outset for the improbable occurrence.

MANHOLES

The system is planned so that all junctions of one sewer with another shall be made at manholes, and also all changes of grade or alignment are to be made at manholes in order that the sewer, being straight between all manholes, may be inspected at all points from the nearest manhole. When straight sewers of the same size and grade extend beyond a distance of about 600 feet inspection pipes capable of allowing a lamp to be lowered into them have been substituted for manholes on account of their relative cheapness. They do not permit of entrance into them, but will simply allow a lantern to be lowered down to the level of the sewer. The manholes also are useful in maintaining ventilation of the sewers, which is essential not only for free flow of sewage but also for the maintenance of sanitation. A deficiency of air will at once set up putrefactive conditions in sewers. the emanations from which will be not only disagreeable but unwholesome. Sewers kept in good condition and well ventilated will not give rise to odors.

MAINTENANCE

Although every sewer system is planned to operate automatically, the proper maintenance of all parts of the sewer system should be guaranteed by regular periodic inspection by the superintendent of sewers, superintendent of streets, or some other regularly designated official. This inspection should include the inspection of every manhole and flush tank at least once in every two weeks, and preferably once a week. Ordinarily this will involve simply the opening of the cover and the looking down into the manhole or flush tank to ascertain if normal conditions prevail. If a manhole inspection shows a sewer stopped or restricted in flow, the obstructing cause must be removed.

Ordinarily flushing will accomplish this. Flushing may be done by a hose from the nearest hydrant, or by temporarily closing the outlet of a manhole with a wooden bulkhead fitted to close the outlet fully but loose enough to be readily removed by a pull on a rope. When the sewage has accumulated to the height of a foot or so in the manhole the bulkhead is to be pulled out and the accumulated sewage allowed to escape and flush out the sewer. Should this not be effective, though it will generally be so, resort must be had to running through the part of the sewer suspected of containing the obstruction or restriction, if sewage is flowing at all, a circular disc of a diameter slightly less than the sewer, with a rope attached to it in such manner as to hold it perpendicular to the axis of the sewer, and letting it float down with the sewage. When an obstruction is reached the erosion of the sewage escaping under the edge of the disc will generally cut out the deposit and restore normal conditions. If the stoppage is complete and no sewage flowing, jointed sewer rods must be introduced into the next manhole below the obstruction and the trouble removed.

Rarely will it be necessary to resort to the ultimate remedy of opening the sewer, but when this does become necessary, the inspection from the nearest manhole below the obstruction will enable the location to be made so closely that only a short section of sewer trench will have to be opened to find the defect. Manhole covers should be kept locked in order to prevent matter or objects being improperly placed therein.

FLUSH TANKS

There have been located at the upper ends of some of the lateral sewers having unavoidably flat grades automatic flush tanks which are intended to receive water from the village water system and automatically discharge their contents once or twice a day through an automatic siphon. Each flush tank will discharge about 300 gallons at a discharge, and the frequency of discharge may be determined and regulated by the small water-cock on the water pipe supplying the tank with water. Eleven of these tanks have been planned for the system, located where shown on the sewer map.

HOUSE CONNECTIONS

Branches for making house connections have been specified in the specifications in front of each lot along each sewer, and where the lots are more than 50 feet front a branch has been placed at every fifty feet. These are to temporarily close with a plate cemented loosely into the vacant end, which can be opened whenever the house sewer is to be connected with the system.

House connections with the sewers should be made only on a written permit from the sewer committee or superintendent, and then only to duly authorized and licensed plumbers. In fact, the village authorities should prepare and enact a code of general rules and regulations governing the making of sewer connections and all plumbing and sewering on premises that are to be connected with the sewers. This falls regularly within the functions of village authorities. It would, moreover, be an excellent plan to have a regular code of general plumbing rules and regulations applying not only to sewering connections, but to all plumbing within the village, since this work bears very directly on the matter of public sanitation, and will be greatly stimulated by the building of sewers. This also falls within the official functions of the village trustees. This latter suggestion, however, is not strictly pertinent to this report.

DISPOSAL WORKS

An examination of the waters of Oil creek for some distance below the village of Cuba shows a condition of the waters and of the bed and banks that, in my opinion, certainly will not warrant the discharge of crude sewage into the stream. On the other hand, I do not think that a high degree of purification is demanded at the present time. It appears very probable, however, that a higher degree of purification may in future be required than is necessary at this time. Whatever is done in this direction now should therefore be of such a kind and order as will permit of extension without sacrifice of present construction. Working along this line I have adopted for this system simple and automatic treatment in a septic tank by which the solids of the sewage are liquefied by biological agencies, or more specifically, by anerobic bacteria, and a certain degree of reduction of the organic matter is secured. The tank is so constructed and located that the effluent from it can be further treated by filtration or otherwise, at any time in the future when such additional treatment is needed, which may never be the case.

The construction of the tank is shown fully on the accompanying drawings. The action of the tank is as follows:

The sewage enters the inlet chamber through the 24-inch pipe, and if the valve in this pipe is open the sewage will flow directly through the pipe to the flap-valve chamber and thence to the creek without any treatment, and in fact without having entered the septic tank proper. When it is desired to send the sewage through the septic, as will normally be the case, the 24-inch valve in the main sewer is closed and the one on the inlet to the tank and the one on outlet from tank are both opened. The sewage then enters the tank, is detained there for a period of several hours, the time being determined by the amount of flow in relation to the volume of the tank, and then leaves the tank, flowing through the outlet chamber and the flap-valve chamber directly to the creek. The action taking place in the tank will be the breaking down of the solid matter of the sewage by the anerobic bacteria, i. e. those which operate in the absence of air, yielding liquid matter, some gas of the marsh-gas order, and some mineral matter, but normally leaving no accumulation of organic solids in the tank, these having all been broken up to the three forms above mentioned. The mineral matter will be small in amount and can readily be removed either by draining into the creek when permissible, or by pumping through the drain piping and pump provided for this purpose.

This same piping admits of emptying the tank or either chamber either by gravitational flow or by pumping as may be desired. A hand-pump is specified in the contract, though it will perhaps never be the case that the pump will be required to empty the septic tank proper, except the lower contents, as the bulk of the contents can always be discharged into the creek by gravity except during high water.

The extremely low and flat condition of the village with respect to the level of high water in the creek makes it absolutely impossible to place the disposal works above the level of high water in the stream. To provide for this the system of valves has been used as indicated on the drawings.

The flap-valve itself will automatically prevent the creek water from backing up into the sewers or tank. The building over the tank has its floor and walls above high water, so that during floods the 24-inch inlet and outlet valves may be closed to prevent the accumulation of sewage from entering the tank, which, however, would not be serious if it occurred; and with the 24-inch valve on the direct pipe line opened, the sewage would then flow through the submerged pipe directly to the creek without any treatment, which would not be necessary during such condition of the creek.

Whenever the amount of sewage from the village exceeds the present capacity of the septic tank the form of construction devised here permits of extending the curved end of the tank without disturbing the building, piping or valves.

SYSTEM OF GRADES

The extreme flatness of the surface of the village and the slight elevation of the general surface of the level portion of the town above the creek, which is the outlet of the system, has made the work of devising a feasible set of grades a matter of very great difficulty. A half-dozen different schemes of grades have been worked out and tried before one at all satisfactory could be found. I have every reason to believe that the system adopted is as good as any that can be devised and still be at the same time low enough to drain low cellars and high enough to sewer into the creek. As it is, the grades in some streets have had to be very light and will require to be laid with very great care and uniformity. There are a few streets or parts of streets that cannot by any plan be sewered without pumping; these are Genesee street, north of the small creek near Corcoran street; Corcoran or Stevens street, Center street and the west portion of Woodruff street.

Whenever it becomes necessary to sewer these streets, if ever, the only available plan will be a system of low-level sewers sewering these streets and leading to a sewage well or pump on Woodruff street at Bull street prolonged. From this well or pump the sewage may be pumped into the Water street sewer at the corner of Bull street by an automatic pump driven by an electric motor, the starting and stopping of which can be done automatically as regulated by the varying level of sewage in the well.

Several such automatic sewage pumps are in operation satisfactorily, and one is now being installed to pump the entire sewage of Saratoga Springs, having a summer population at times of 50,000 people. Such a low-level system for the streets mentioned has been designed so far as relates to the adoption of grades and elevations, and is shown on the sewer map and the profiles by a system of dotted lines. The location of the sewage well is also shown near the corner of Woodruff and Bull streets prolonged. Bates avenue and the eastern part of Woodruff street, which now are furnished with high-level sewers, may be changed to the low-level system with some advantage whenever such system is built.

I desire to impress upon the village authorities of Cuba the importance of maintaining a strict adherence to the system of grades and elevations adopted whenever the sewers are built. Unlike a water pipe which will carry water under pressure regardless of its grade or elevation, a sewer flows by gravity alone, and the quantity of sewage it will carry depends wholly on the steepness of its grade. There is therefore a fixed and an unchangeable relation between the diameter, the grade and the quantity of sewage a sewer will carry, and these have all been carefully worked out to harmonize while meeting the requirement of proper depth for house sewage and disposal outlet. These quantities should under no circumstances be disturbed or attention to them during construction slighted, unless modified or changed by a competent sewer engineer after studying these three elements and the devising of a proper hydraulic substitute for the elements changed. On any of the flat grades in the system a change of elevation of one end of a short sewer of a few tenths of a foot may easily diminish the discharging capacity of the sewer to less than that of the sewers contributing to it. The construction of the system, whenever built, should be entrusted only to a competent and experienced sewer engineer and to a competent and experienced sewer contractor.

There is now no difficulty in finding these men, and the slight difference in cost of securing them as compared with incompetent men will be insignificant as compared with the cost of remedying defects of judgment or skill on the part of the men placed in charge.

BENCH-MARKS

To facilitate the work of construction and to insure using a proper set of levels I will say that on the sewer survey every line of levels was made to close back on the starting point, thus insuring correctness in the sets of levels, and to preserve these a system of bench-marks on fire hydrants was established and the elevations carefully preserved. A list of all these bench-marks, with their location and the elevations, is appended to this report.

RECORDS OF BRANCHES FOR HOUSE SEWERS

I beg to recommend that when the system is constructed the engineer in charge be requested to record and preserve for the sewer committee or superintendent a list of every house connection branch inserted in the sewers, with its distance from the nearest manhole properly stated. This will be a matter of very great convenience and saving of expense and injury to streets when house sewer connections are made with the sewers ever afterward.

ESTIMATE OF COST

Appended to this report will be found an estimate of cost of the entire village system of sewers complete, except the low-level system, which may never be required.

It is not to be understood that all the sewers now planned and estimated are necessarily to be built at once. The regulations of the State Department of Health in providing for the approval of sewer systems, in accordance with the village law, prescribe that the plans must be for the *entire village*, whether to be built at once or not. This is in view of the close and inseparable relation between the sewers in one part of a village and those in other parts through the matter of grade and elevation. On my first inspection at Cuba your attorney, Mr. J. C. Leggett, gave me a list of the number of streets on which sewers would probably be required in the near future; this list aggregated about 30,000 linear feet of sewers. The total length of sewers comprised in the system as planned is about 45,000 linear feet of sewers, or 50 per cent more than the above estimate. My examination would lead me to think that Mr. Leggett's list of streets would probably meet present needs. It should be understood that there is no harm in omitting the upper ends of sewers or omitting lateral sewers as a whole, but that no feature should be omitted below the uppermost part built; in other words, the sewers should be built completely and with all the parts and accessories as planned upstream from the outlet, but they may be stopped at any point, either temporarily or permanently, so long as they are complete below that point.

BULL STREET SEWER

It is presumed that Bull street sewer will not be built at first. As this street furnishes the proper route for the sewage of West Main street to reach Water street, this has temporarily been carried down to Elm and thence to Water street, but when Bull street is sewered I have provided for and have recorded on the profile the changing of the route of flow of Main street sewage down Bull street, thus leaving free some sewer capacity for Elm and following streets.

DRAWINGS AND DOCUMENTS FURNISHED

The following is a list of the drawings and documents submitted herewith as comprising the plans:

(1) A general contoured sewer map in triplicate; one copy on canvas-mounted white drawing paper, one on tracing cloth and one on black print.

(2) A set of five sheets of street and sewer profiles, with index-title sheet, bound up together; one set on profile tracing cloth, and two on black-print paper.

(3) A drawing of septic tank for disposal works; one copy on tracing cloth, and two on black-print paper.

(4) A drawing of the building over septic tank; one copy on tracing cloth, and two on black-print paper. Drawing No. 3 also contains details of manhole, flush tank and inspection pipe.

(5) A form for "Notice to Bidders," "Proposal" and "Preliminary Bond for Bidders."

(6) A form for "Contract and Specifications and Indemnity Bond."

(7) This report with appended "Estimate of Cost" and "List of Bench-Marks."

GENERAL SUMMARY

The following general summary of the data and statistics forming the basis of this report is given for convenience of reference:

Capacity of the street sewers as planned, population of 7300.

Capacity of present disposal works, population of 2000.

Assumed amount of sewage contributed per capita per day, 100 gallons.

Ground-water discharging capacity of system, per day, 116,000 feet.

Linear feet of sewers planned, not including low-level, 45,631 feet.

Linear feet of drain tile provided for, 30,052.

Number of manholes in system as planned, 75.

Number of inspection pipes as planned, 34.

Number of automatic flush tanks as planned, 11.

Total estimated cost of entire system, including disposal works and tile drainage, but not including low-level sewers nor including land and right of way, $41,094.45.

I trust the plans and this report may be satisfactory and clearly intelligible. Should there be any points on which further information or explanation is desired, I shall be glad to make the same clear if in my power to do so.

I am, dear sirs,

Very truly yours

OLIN H. LANDRETH

Consulting Engineer

DEPEW

Addition of an overflow sewer

The original plans for the sewer system of the village of Depew were approved by the State Board of Health on June 30, 1896, and appear in the seventeenth annual report. Certain changes in the original plans were approved by the Board on December 31, 1896, and on April 28, 1897, and appear in the eighteenth annual report. Further changes were approved on January 28, 1898, and appear in the nineteenth annual report, and still others were approved by the State Board of Health on February 23, 1899, and appear in the twentieth annual report. On July 10, 1900, the State Board of Health approved plans for a system of sewage disposal works, and on September 20, 1900, it approved plans for still further changes in the street system of sewers. On July 21, 1901, the State Commissioner of Health approved plans for changes and additions in the street system which appear in the twenty-second annual report.

On August 22, 1903, the State Commissioner of Health approved a plan for an overflow sewer at the sewage disposal plant, which appears as Plate XIII of this report.

DOLGEVILLE

Revised system of sewers and sewage disposal

Original plans for a separate sewer system and chemical precipitation works were approved by the State Board of Health on February 22, 1898.

On December 23, 1903, the State Commissioner of Health approved plans for a revision of the system of sewers and for an entirely different system of sewage disposal. These plans comprise:

A contoured sewer map of the village, forming Plate XIV of this report.

A sheet of sewer profiles, forming Plate XV of this report.

A sheet of sewer details, forming Plate XVI of this report.

Three drawings of the sewage disposal system, forming Plates XVII, XVIII and XIX of this report.

Two reports by the designing engineer, dated December 15, 1903, and December 28, 1903, hereto appended.

Contract, specifications, form of proposal and preliminary bond, on file but not published.

AMSTERDAM, N. Y., *December* 15, 1903.

To the Board of Sewer Commissioners, Dolgeville, N. Y.:

Gentlemen—I have the honor to submit to you in accordance with your instructions of September 19, 1903, a revised plan of a " separate " system of sewers and a design of a sewage disposal plant for the village of Dolgeville, accompanied by a set of specifications for the sewer system and the disposal plant and forms of bond, contract, proposal and notice to bidders for the letting of the work.

For the most part the sewer grades correspond to those of the sewer system planned in 1897 by Allen Farrington & Co., and approved at that time by the State Department of Health. In a few instances changes have been made to lighten cuts, as in the case of the Slawson street sewer, or to increase velocities as in the case of the Gibson street sewer.

The sizes of the trunk sewers have been reduced throughout, it being thought that a system designed to provide for a populated district reaching out from the center of the town, say in general two blocks farther than the populated district now extends would give sufficient margin of increase.

The sizes have been designed on a basis of four persons to each 50-foot lot, a total of 11,100 persons in the district planned for, each contributing 100 gallons of sewage in twenty-four hours as an average flow, this quantity being considered as liable to be doubled at time of maximum flow. In the system this maximum flow will fill the pipes one-half full after making allowance for .03 cubic foot per second per mile of sewer for ground-water leakage into the sewer.

For the disposal of the sewage, as per advices from the State Department of Health, it is planned to install a septic tank. Treatment in this tank will result in a sufficient degree of purification as to permit the discharge of the effluent into the East Canada creek without creating unsanitary conditions.

The operation of the tank is described in the specifications for the tank.

The population counted on in the design of the disposal plant does not allow for much increase above present population as in the case of the system as a whole, since the tank may be extended as future necessity requires, with very little expense and without disturbing the operating arrangements. Furthermore, it will be some time before the alotted limit of 2200 persons contributing sewage to the tank is reached and is passed, and as the time of detention is 12 hours it is very possible that the tank will be found to perform its work satisfactorily when a greater amount of sewage than 340,000 gallons per day (including ground-water leakage) and a shorter time of detention have become the governing conditions for the operation of the tank.

The small septic tank for the Breckwoldt factory and nearby residence district is designed to operate on the same principle as the large plant, but on account of the small quantity of sewage to be treated it can be of much simpler design. For the present the lower outlet is to be used, though both outlets are to be built. The capacity of the tank when in operation under the lower outlet provides for the treatment of an amount of sewage contributed by 150 persons, and when the number of persons contributing sewage to the tank has increased to 250, the lower outlet should be closed and the upper outlet connected to the pipe sewer leading to the creek. For the present simple septic treatment in this tank is all that conditions require, though at some time in the future it may be found necessary to provide sand filtration beds for the effluent to pass through on its way to the creek.

The total length of sewers planned, including the Second street inverted siphon, is 30,965 linear feet, or 5.86 miles, and the approximate estimate of the total number of drain tiles needed is 16,700 linear feet.

Before construction work is started in the spring test pits should be dug on different streets in order to ascertain the size and system of tile drains necessary to relieve cellars from ground-water flooding.

MANHOLES

The system is planned so that all junctions of one sewer with another shall be made at manholes, and also all changes of grade or alignment are to be made at manholes in order that the sewer, being straight between all manholes, may be inspected at all points from the nearest manhole. When straight sewers of the same size and grade extend beyond a distance of about 600 or 700 feet inspection pipes capable of allowing a lamp to be lowered into them have been substituted for manholes on account of their relative cheapness. The manholes also are useful in maintaining ventilation of the sewers, which is essential not only for free flow of sewage but also for the maintenance of sanitation.

MAINTENANCE

Although every sewer system is planned to operate automatically, the proper maintenance of all parts of the sewer system should be guaranteed by regular periodic inspection. This inspection should include the inspection of every manhole and flush tank at least once in every two weeks, and preferably once a week. Ordinarily this will involve simply opening the cover and looking down in the manhole or flush tank to ascertain if normal conditions prevail. If a manhole inspection shows a sewer stopped or restricted in flow, the obstructing cause must be removed. Ordinarily flushing will accomplish this. Flushing may be done by a hose from the nearest hydrant, or by temporarily closing the outlet of the manhole with a wooden bulkhead fitted to close the outlet fully but loose enough to be readily removed by a pull on the rope. When the sewage has accumulated to the height of a foot or so in the manhole the bulkhead is to be pulled out and the accumulated sewage allowed to escape and flush out the sewer. Should this not be effective, though it generally will be, resort must be had to running through the part of the sewer suspected of containing the obstruction or restriction, if sewage is flowing at all, a circular disc of a diameter slightly less than the sewer, with a rope attached to it in such manner as to hold it perpendicular to the axis of the sewer, and letting it float down with the sewage; when an obstruction is reached the erosion of the sewage escaping under the edge of the disc will generally cut out the deposit and restore normal conditions. If the stoppage is complete and no sewage flowing, jointed sewer rods must be introduced into the next manhole below the obstruction and the trouble removed.

Rarely will it be necessary to resort to the ultimate remedy of opening the sewer, but when this does become necessary the inspection from the nearest manhole below the obstruction will enable the location to be made so closely that only a short section of sewer trench will have to be opened to find the defect. Manhole covers might be kept locked in order to prevent matter or objects being improperly placed therein.

FLUSH TANKS

There have been located at the upper ends of some of the lateral sewers having unavoidably flat grades automatic flush tanks which are intended to receive water from the village water system and automatically discharge their contents once or twice a day through an automatic siphon. Each flush tank will discharge about 300 gallons at a discharge, and the frequency of discharge may be determined and regulated by the small water-cock on the water tank supplying the tank with water. Nine of these tanks have been planned for the system, located where shown on the sewer maps.

HOUSE CONNECTIONS

Branches for making house connections have been specified in the specifications in front of each lot along each sewer, and where the lots are more than 50 feet front a branch has been called for at every 50 feet. These are to be temporarily closed with a plate cemented loosely into the vacant end which can be opened whenever the house sewer is to be connected with the system. House connections with the sewers should be made only on a written permit from the sewer commissioner or superintendent and then only to duly authorized and licensed plumbers. In fact, the village authorities should prepare and enact a code of general rules and regulations governing the making of sewer connections and all plumbing and sewering on premises that are to be connected with the sewers. This falls regularly within the functions of the sewer commission.

It would, moreover, be an excellent plan to have a regular code of general plumbing rules and regulations applying not only to sewering connections but to all plumbing within the village, since this work bears very directly on the matter of public sanitation, and will be greatly stimulated by the building of sewers. This also falls within the official functions of the sewer commission.

RECORD OF BRANCHES FOR HOUSE CONNECTIONS

It is necessary that, when the system is constructed, the engineer in charge be requested to record and preserve for the sewer commission or superintendent a list of every house connection branch inserted in the sewers with its distance from the manhole. This will be a matter of very great convenience, and is in fact necessary for the saving of expense and of injury to streets when house sewer connections are in the future made with the sewers.

DRAWINGS AND DOCUMENTS FURNISHED

The following is a list of drawings and documents furnished and comprise the plans. Maps are in triplicate, black prints on cloth:

(1) A general contoured sewer map.

(2) A set of profiles of streets and sewers.

(3) A plate of details of structures for the sewer system.

(4) A design of a septic tank for the main disposal works.

(5) A drawing of the building over the septic tank.

(6) A design of a small septic tank for the Breckwoltd factory and near-by residence district.

(7) A form for "Notice to Bidders," "Proposal" and "Preliminary Bond for Bidders."

(8) A form for "Contract and Specifications and Indemnity Bond."

(9) This report with appended estimate of cost.

Hoping that the points in this report will be clear to you; that the system and disposal works as planned may meet your approval, and that you will feel free to call on me for any further explanation, I am,

Respectfully yours,
H. B. CLEVELAND, C. E.

AMSTERDAM, N. Y.

SUPPLEMENTARY REPORT

AMSTERDAM, N. Y., *December* 28, 1903

To the Sewer Commissioners of the Village of Dolgeville, N. Y.:

Gentlemen—In the matter of cellar drainage to be afforded by the sewer system for Dolgeville, the design of which is submitted to you, I find that only a very few houses in the village are not provided for adequately in this respect, the exceptions being two houses on the east side of Main street about 100 and 150 feet respectively south of Faville avenue, in which case the sewer grade is four inches higher than the cellar bottom. In the rear of these houses, whose cellars are, however, never troubled by ground-water, the ground falls away to an elevation lower than the cellar bottom, giving a chance for relief if ever needed. On the east side of Main street, about 200 feet north of State, cellars have a minimum difference of elevation above the sewer grade of 1.1 feet, but as the houses are built close to the street line this would seem to give sufficient fall from the cellar bottom to the drain-tile system. It must be understood, by the way, that the cellar drainage is to be effected in all cases not by discharging cellar or ground-water into the sewer proper but into the drain-tile system. One house, on private property near Baker street, can be provided with sewerage facilities by connection with the Baker street line, although the sewer connection would probably be so shallow as to necessitate embankment over it for protection. This house is situated on the bank of a stream, and so is amply provided with cellar drainage to a depth as low as a cellar could be sunk.

Respectfully yours,
H. B. CLEVELAND, C. E.

FORT EDWARD

Original sewer plans

Plans for a separate system of sewers and sewage disposal were approved by the State Commissioner of Health on February 25, 1903, and comprise the following:

A contoured sewer map of the village, dated 1901, forming Plate XX of this report.

A sheet of sewer profiles, forming Plate XXI of this report.

A drawing of "Jumping Weir" interceptor, forming Plate XXII of this report.

A drawing of sewage purification work, forming Plate XXIII of this report.

Two drawings of manholes and flush tanks, on file but not published.

A report of the designing engineer, dated February 5, 1902, appended hereto.

A set of specifications on file, but not published in this report.

REPORT

To the Trustees of the Village of Fort Edward, N. Y.:

Gentlemen—The village of Fort Edward is situated on the east bank of the Hudson river, in Washington county, N. Y. By the enumeration of 1898 it contained a population of 3735, in 1902 the population is 3830. The lower portion of the village is divided in two parts by the Champlain canal, and the branch of this canal, extending to the works of the International Paper Company, separates the lower portion of the village from the hills. The village is also intersected northeasterly and southwesterly by the Delaware and Hudson Company railroad, having a branch running northerly to Glens Falls and another branch to the paper works above mentioned. The ground in the lower portion of the village is flat, the streets being from 10 to 22 feet above low water in the river, and is a sandy loam having ground-water within a few feet of the surface in the district east of the canal. North of the paper company's canal the ground rises abruptly in two hills separated by the depression occupied by the railroad to Glens Falls. To the east of this railroad the hill is sandy. To the west is also sand, with soft slate rock along the portions nearer the river bank.

The surveys of the village were commenced and practically finished during the fine weather of last September and October. The work done was well within the limit of error fixed at 1 in 2000. The levels are run from the United States Geological Survey bench-mark described as a "Nickle plate set at the north side of the west entrance of the high school building, elevation 145.55 above sea level." From this "home bench" the elevations of the tops of the letters on the hydrants throughout the village were determined. These heights will be found in the two level books.

Many of the streets of the village have fair grades, as they have been worked from time to time and I have endeavored to follow these present grades as closely as possible and get fall enough to carry the surface water along the gutters to points where it can be taken into the drains. Other streets such as Marion, Beverly, Case, Frank, Seminary, at the southeast corner of the Seminary grounds, and McCrea, at the intersection of Seminary place, and a few others require considerable work to make them satisfactory either for drainage or appearance, and after careful consideration of each case I recommend the grades shown in the profiles. In several other places canal or railroad crossings, together with improved property in the immediate vicinity, render improved street grades impracticable at the present time. You have already my opinion on the suggestion to abolish the grade crossing where Broadway crosses the D. & H. R. R. Both this crossing and the one at East street can be made an undercrossing by raising the railroad tracks say six feet at Broadway and eight feet at East street. The former would make the tracks only three and one-half feet higher and the latter level with the present railroad bridge over the canal.

In draining the village there are three considerations which led to the adoption of a modified separate system of sewers. First, the demand of the State that the river shall not be polluted with raw sewage, and for treatment the separate system will give less volume to be disposed of. Second, as noted above, a portion of the village has steep grades, hence brings the storm-water rapidly to the foot of the hills, but from the line of the foot of the hills comparatively long lines of flat sewers must be constructed to a suitable place where all lines can be brought together for one purification plant. Third, the river and creeks or waterways afford, pretty generally, convenient outlet for such storm sewers as may be needed. I find in most of the streets that sewers have been constructed terminating in the nearest canal, creek or ditch or running directly to the river. To these sewers are connected the house wastes, roofs and numerous grate inlets for surface water. These existing sewers are generally small, and while in some streets they may answer for several years in others there will be demands for larger sizes. From the nuisance caused by the outlets of these sewers there is already demand for relief.

The system of sewers proposed is calculated for house wastes, including roof-water, but no other surface water. A sewer is planned for each street within the sewer district the same as if there were no existing sewers. As these sewers are constructed the houses should be connected with them and the former sewers left intact for draining the street. In case an old sewer is used as a lateral and connected to the new sewers the surface water should be cut off, which can be done in many instances by grading the street so as to run the surface water along the gutter to other points of discharge or by the construction of a new line of storm sewer.

The new system of sewers are brought to one outlet on the river bank just north of the mouth of the creek. To accomplish this a line about 2200 feet long will have to be constructed on a grade of 1 in 1000 from the south end of Rogers street by as direct a right-of-way as can be secured to the corner of Broadway and Montgomery street. This line is designed to drain all houses east of the canal. Another line will have to be constructed up Broadway and through Washington street to the proposed canal crossing having slightly better grades but a depth of 19 feet under the railroad tracks. To this line the roof-water from upper Broadway, McCrea and Underwood streets will in time of storm come very rapidly, and to obviate the necessity of providing for this large flow to the distant outlet, an overflow manhole has been planned at the corner of East street from which the water in time of storm will all or nearly all pass to the river directly. In times of ordinary flow the sewage will fall into the 10-inch pipe and be carried to the outlet.

The means of purifying the sewage before discharging into the river is by a septic tank and filter beds. The former is designed to retain the sewage eight hours when running at the rate of 48 cubic feet per minute, which is the flow of 100 gallons per day from a population of 5000. It will be probably several years before the village will contribute this amount of sewage, but with several miles of the sewers to be constructed through wet sandy soil, in some places running into quicksand, it is inevitable that a considerable amount of ground-water will work into the sewers to be taken to the septic tank. This allowance for ground-water must not be construed to mean that any care is to be relaxed in making the sewers as water-tight as possible, and the village should urge such construction as strongly as possible.

There are four filter beds, each in turn being filled from the septic tank. Each bed contains 12,000 cubic feet. When filled with coke or broken stone there will remain about 5000 cubic feet of voids. When the amount of sewage named above is flowing, these four beds will be filled about 3⅓ times each twenty-four hours. Each bed will thus fill up in a little less than two hours and remain filled until the next is full, then the discharge valve will be opened by this next bed, and after emptying it will remain empty until the two remaining beds have been filled. In emptying a supply of fresh air is drawn down into the voids of the filtered material, which renews the aerobic bacterial life there present so that the same filtering material can be used indefinitely.

During a storm the passage to the filter beds will admit about four times the amount of flow designed for, and above this amount the flow will pass over the weir in the sand pit and directly to the river. The purification plant is designed to show a plan for breaking down the organic compounds present both in solution and suspension in the raw sewage by the anaerobic bacteria in the septic tank and the oxidation of the effluent by the action of the aerobic bacteria in the filter beds. And the whole action to take place within the five feet two inches fall between the flow of the proposed sewer at the outlet and the ordinary low water in the river as taken November 23, 1901. A rise in the river of one foot will begin to flood the filter beds, and above this point will reduce the portion in use in inverse proportion to the rise. But as the river rises above one foot the necessity of purification except by dilution ceases. There is a watershed to the Hudson at Fort Edward of about 2700 square miles which should furnish, and probably does during the dryest seasons, 500 cubic feet per second into which Fort Edward, when it reaches 5000 population, will empty about one cubic foot per second on the average throughout the day. In consideration of this large dilution it is not certain how much will be required by the Health Commissioner of the State to be constructed of these purification plants at the present time. To prevent sediment from filling in the voids of the filtering material when the river is high enough to cover the filter beds, hemlock planking has been placed over them and anchored down, around which the air may circulate.

The sewers planned for consist of nine miles of sewers ranging in size from 8 to 27 inches, 85 manholes and 6 flush tanks. Where a sewer ends near the canal with the water in the latter higher than the street it is recommended that if possible to get the consent of the canal authorities a four- or six-inch iron pipe be laid from such canal to the nearest manhole, such pipe to be fitted with a hand-valve and to be used for flushing as the sewers may require it.

The cost of the sewers as planned is estimated to be $55,000; of the septic tank, $7,400; of the filter beds, $11,000.

Accompanying the report I submit:

(1) Survey and level note books.

(2) Map of the village at a scale of 200 feet to 1 inch.

(3) Profiles of every street in the village at horizontal scale of 25 feet to 1 inch and a vertical scale of 5 feet to 1 inch, showing present street level, proposed street grades and sewer lines.

(4) Map showing plan of proposed sewerage system, contours, existing drains and the location of water and gas mains.

(5) One sheet of profiles of streets in the sewer district, showing the elevations and grades of proposed sewers.

(6) Drawings of all structures needed in the construction of the proposed sewerage system.

(7) Specifications for constructing the sewerage system.

Respectfully submitted.

H. B. CLEVELAND

Civil Engineer

AMSTERDAM, N. Y., February 5, 1902.

LAKE PLACID

Plans for sewage disposal system

Plans for a system of sewers of that portion of the town of North Elba, Essex county, N. Y., which now forms the village of Lake Placid were approved by the State Board of Health on June 7, 1893, and appear in the fourteenth annual report.

Plans for a system of sewage disposal works were approved by the State Commissioner of Health on June 19, 1903, and comprise:

A drawing of the sewage disposal system, dated 1903, and forming Plate XXX of this report.

A report by the designing engineer, hereto appended.

Contract and specifications for the construction of the sewage disposal system, on file but not published in this report.

To JOHN SHEA, *Village President*, ALBERT H. BILLINGS and EDWARD KENNEDY, *Board of Village Trustees, Lake Placid, N. Y.:*

Gentlemen—At your request I have made an investigation of the question of purifying the sewage of the village of Lake Placid, also have made surveys for a purification plant and herewith present plans for the same, also the following report:

I have examined the lands on both sides of Chubs river down to where Chubs river flows into the West Branch of the Ausable river and find there is really but a small amount of land suitable for sewage filtration that can be reached by gravitation with the outlet sewer from your village.

I think the most desirable land for this purpose is about 2000 feet below where the sewer now empties into the river. At this location there are about five acres of land that is comparatively level, and directly adjoining on the westerly side is to be had plenty of medium-sized sand; this sand is not as coarse as is usually used, but is clean and will make a very good filter.

After making a careful study of the amount and quality of the sewage from your village, not only at the present time but with a view of providing for any future demands, I believe the best method of treatment is by first passing the sewage into a septic tank and then filtering the effluent through sand filters; in this way the amount of land to be used is reduced to about one-third what it would be if the sewage applied direct to the filters and will not require anywhere near as much care. The functions of a septic tank is to break down the suspended matter to a manageable state either by resolving it partially into gases and finely divided sediment, or if possible wholly into impurities in solution and the effluent then passed to the sand filters.

In designing a purification plant it is necessary to as nearly as possible obtain the ordinary average flow of sewage, also the minimum and maximum flow.

In your village not only the quantity of sewage varies widely but also the quality, as the sewage from hotels and laundries is very much more difficult to treat than ordinary house sewage. From the figures that I have been able to get giving number of guests registering at the various hotels and boarding houses I estimate that during the hotel season there are in the village of Lake Placid and in the hotels just outside the village, which sewage will eventually be disposed of through the village system, about 4500 people, while during the winter there are only about 2000 people. From these figures and from the best information I can get I estimate that at the present time there are about 3000 people using the system in the summer and about 1500 in the winter. To meet these wide fluctuations I have designed the septic tank so that just one-half the quantity of sewage may be treated in the winter that is provided for in the summer, although the sewage from the large hotels in the summer is more difficult to treat than the ordinary house sewage, yet the colder temperature in the winter lengthens the fermentation period and therefore the sewage in the winter will require about the same length of time in the tank as in the summer. The filtration areas may remain the same in the winter as in the summer, or part of it cut out if found more satisfactory, but I think it would be best to cut out about half the beds during the cold winter months. However, this can be best decided upon by actual experience with the working of the filters during the cold months.

To obtain the best results from a plant of this kind the size of the tank should be so proportioned that the sewage will remain just long enough and not too long in the tank. This proportioning of the tank is of great importance not only because it enables the tank to produce high efficiency, but because it also enables the filters to operate with equally high efficiency.

A septic effluent that has been held too long in the tank will show signs of decomposition and is not easily reducible in the filters; in fact, it has been clearly shown by competent authorities that a satisfactory treatment of such effluent is exceedingly difficult, while on the other hand an effluent that passes through the tank too quickly will contain much suspended matter and will clog the filters in a short time.

To meet these requirements I have designed a tank with two compartments so constructed that if found necessary one of these compartments can be divided into two parts and one of these cut out when not needed; it is also intended that only one of these compartments be used during the winter or during the ordinary flow of sewage and the other put in use during the hotel season, or to accommodate the maximum flow of sewage. This tank is designed so that the sewage will enter at two points at one end of each compartment, and the effluent is to be drawn off under baffle-board two and one-half feet below the surface and then through three openings, each 6 inches by 24 inches, into the dosing chamber. The dosing chamber has a capacity of 18,000 gallons, and is operated by an automatic controlling device consisting of six flushing devices which will automatically flush in rotation, discharging at the rate of about four cubic feet per second. Each of these flushing devices is connected to a filter bed with a 15-inch sewer pipe so that automatically and in rotation each bed will receive a dose of 18,000 gallons. Outside of the dosing tank is a manhole or box for each flushing device and into which it will discharge. Each of these boxes contain two disc valves, and by opening or closing these valves the effluent may be diverted into any bed desired. In getting up these plans it has been my aim to design a plant that will give as high an efficiency as is possible with a small amount of care. Although this plant is designed to operate automatically, it should not be left entirely without attention; just how much attention will be needed can only be determined by experience as no two plants will work exactly alike, but if you will place some good competent man in charge of this plant it will only take a small part of his time to attend to it and you will, in my judgment, find that the cost of maintaining the plant will be very low and the results obtained satisfactory. I understand that at the present time there is no surface water from street drainage entering the system, and this should not be allowed in the future under any circumstance because at times of storms the volume flowing in the sewers would not only be so large that it would pass through the tank unacted upon, but it would also carry so much foreign matter that it would greatly reduce the efficiency of the tank and soon clog the filters.

Very respectfully submitted.

CHAS. E. COLLINS
Consulting Engineer

Drexel Building, Philadelphia, Pa.

LARCHMONT

Plans for sewer extensions to Larchmont Park

Original plans for the sewer system of the village of Larchmont were approved by the State Board of Health on May 20, 1898, and appear in the nineteenth annual report. Plans for a change of location of the outlet sewer were approved by the State Board of Health on April 16, 1899, and appear in the twentieth annual report. On January 15, 1902, the State Commissioner of Health approved plans for changes and additions to the system, which plans appear in the twenty-third annual report.

On October 30, 1903, the State Commissioner of Health approved plans for additions to the sewer system of Larchmont, covering the portion of the village called Larchmont Park. These plans comprise:

A sewer map of Larchmont Park, Larchmont, N. Y., dated August, 1903, forming Plate XXIV of this report.

A sheet of sewer profiles, forming Plate XXV of this report.

A drawing of pump well and pump house, forming Plate XXVI of this report.

Two sheets of sewer details, on file but not published in this report.

A set of specifications, on file but not published in this report.

LESTERSHIRE

Original plans

Plans for a separate system of sewers and sewage disposal were approved by the State Commissioner of Health on February 27, 1903, and comprise the following:

A contoured sewer map of the village of Lestershire, dated 1902, forming Plate XXVII of this report.

A drawing of sewerage treatment works, dated 1902, forming Plate XXVIII of this report.

A drawing of sewer details, dated 1902, forming Plate XXIX of this report.

A roll of sewer profiles, on file but not published in this report.

A report by the designing engineers, hereto appended.

A set of specifications and contract, on file but not published in this report.

LESTERSHIRE, N. Y., SEWERAGE SYSTEM—REPORT

The village of Lestershire, Broome county, joins the city of Binghamton on the west. The Susquehanna river flows northwest on its generally westward course past the west boundary of the village and about one-half mile west of it. The only stream that passes through the village is Choconut creek, a small stream which runs quite low in the summer season. This creek enters the village near its northeast corner and passes out of it and around its northwest corner and eventually empties into the Susquehanna river. This river has a watershed above Lestershire of over 2300 square miles. It is a large stream and permanently so. Its minimum dry weather flow is estimated at about 340 cubic feet per second in the tenth national census report on water-power. After passing Lestershire, the river flows westwardly past or through the villages of Endicott, Union and Owego in this State. It leaves the State near Waverly, and in Pensylvania passes Sayre, Athens, Towanda and so on southerly. The only village below Lestershire within the State of New York using or contemplating to use the Susquehanna as a public water supply is the new town of Endicott, about six miles west of Lestershire. This new town derives its present supply from a well, but contemplates making a direct connection with the river for a larger supply and to filter the water so taken. The boroughs of Sayre and Athens, Pa., about 35 miles down the river, are supplied with water from the Susquehanna. The city of Binghamton and towns farther up the river discharge their sewage, untreated, into it.

The present population of Lestershire is nearly 4000, and the chief manufacturing industries are a shoe factory and a felting works. The corporation covers an area of about one square mile. While the village is hilly, the extremes in elevations are not great, as a glance at the contour map will show.

The Erie (N. Y., L. E. & W.) and the Lackawanna (N. Y., L. & W.) railroads pass through the village, as does also the Binghamton electric railway on its way to and from the villages of Endicott and Union.

The village owns its waterworks, the water of which is pumped from deep driven wells, located near the north side of the corporation, to a reservoir on the hill to the north of the village and fed from there to town. The works have been in operation for about ten years, and the use of water is very general. The consumption of water is about 400,000 gallons daily. The water is apparently of an excellent quality.

Notwithstanding the fact of the great dilution that would be rendered by disposal direct into the Susquehanna, it is considered inadvisable to discharge the crude sewage into a river which is used as a public water supply in a neighboring State, although so far distant even if no use was made of the river as a water supply within the State of New York. Therefore it is recommended and the plans so provide that the sewage be so treated as to liquify the organic matter in a septic tank, the sludge being settled to the bottom of the tank, and when accumulation there requires pumped on to the adjoining ground, prepared for its reception. To this end the sewage of the entire village is carried to one point on Riverside drive at the Lackawanna railroad, and from thence discharged through a sewer running westwardly, parallel with the railroad, into the septic tank. The overflow from the tank returns to the sewer, which continues on at a lower elevation by its former course to the Susquehanna. It is contemplated that on account of the gravelly nature of the soil no especial preparation of the ground will be necessary to fit it for receiving the sludge, except to level it and perhaps in time to divide it into separate beds so that the sludge may not prove offensive by its application in too large quantities over one area. With the small amount of sludge compared to that obtained from the chemical treatment of sewage, no nuisance should obtain if the sludge is properly distributed and worked into the surface of the ground. Sufficient land is convenient and procurable. It is recommended that from five to eight acres of land be purchased at the site of the works so that, with the uncertainties of the future as to what more or different might be required in the way of treatment, a sufficient area of land would be in the hands of the village. In addition to this the right-of-way for the sewer from the treatment works to the river, which would ordinarily be taken as an easement, should be taken in fee with the right of drainage into the "cove" or arm of the river nearly touching the sewer line near the second manhole from the river. The right of way should be of sufficient width for the laying of an additional sewer or drain from the works if required for drainage of the sludge beds. The right to drain the beds to the "cove" would render unnecessary the carrying the drain to the main channel of the river.

On account of the floods in the Susquehanna river it was found desirable to locate the treatment works at as high an elevation as could be readily obtained with economical construction, and to this end the works are placed just west of the corporation line, where a suitable location was found. Inquiry failed to determine the exact maximum flood-height at this point, but it is probably somewhere about elevation 26.0 or elevation 826 A. T.

The plant proposed should effectually treat the sewage, at slight expense for maintenance, and furnish a satisfactory effluent for a village of nearly double the present population of Lestershire.

In the design of the treatment works the maximum flow of sewage is taken as 450,000 gallons a day, and the tank has a capacity for holding about twelve hours' average flow.

At the upper manhole at the treatment works the storm-water from the streets is diverted from the works by passing over a leaping weir and emptying direct into the Susquehanna. A storm overflow is also provided at the lower or west end of Main street. This overflow is intended to relieve the system of caring for all of the water of heavy storms in its mains on the Riverside drive and the Riverside drive outlet.

As can be inferred from the above the plans provide for caring for the street surface water from such points in the village as has no convenient stream to which to carry it. To relieve the system of the possibility of becoming overcrowded by the surface water, the latter is intended to be excluded where it can be done at reasonable cost. The pond adjoining Willow street and Grand avenue it has been especially desirable to drain, and that end is contemplated by the plan.

The soil within the village consists generally of sand or gravel, and the occurrence of wet cellars is exceptional. Such do exist near the Willow street pond, and at times also in some of the few houses north of the Erie railroad. The draining of the pond will remedy the evil at the first place, at least until such time as the pond becomes filled in and built up, when the level of the ground-water may again rise somewhat in this locality. To permanently provide for the drainage of the cellars in these localities, subsoil drains to the extent of 5000 feet, of two to four inches diameter, are included in the specifications, to be laid where the lowering of the ground-water is desirable.

The village of Lestershire being a town of recent growth has benefited by the experience of other villages in building houses too low, with the result that here the houses stand generally very high, with the benefit of having very few low cellars. However, there are very few cellars the sewers in front of which are not low enough to provide cellar drainage if that were needed. The profiles show where the lowest cellars are situated.

It is believed that the only houses not provided with sewerage are the three houses on Mill street. These houses are on the lower half of the street, which falls too rapidly from Main street to admit of it being sewered into the Main street sewer. No other outlet remains for these houses except at a prohibitory cost.

Of the houses having sewerage facilities there are three which are not provided with a sewer sufficiently low to admit cellar plumbing and drainage. These are on St. Charles street, and are the three houses about four to five hundred feet from Main street which were built in a hollow in the street (now filled) and which houses are raised so as to make a basement of the first floor. Their cellars are too low to drain except at unwarranted cost. Besides these there are four low houses on the north side of Bennett avenue which, it is intended, will sewer to the rear of their properties into the interceptor sewer.

There are several streets for which to provide satisfactory sewerage it will be necessary to grade in a proper manner. Some of these are new streets not yet built upon and not yet accepted by the village authorities. The streets referred to especially and which are also noted on the profiles are Baker, Albert, Clarence avenue, Bennett avenue and Sherman avenue. These streets, with others if properly graded, would materially reduce the cost of the sewerage system.

The minimum diameter of sewer adopted for the system is six inches, and the minimum grade for that size is six-tenths of a foot in 100 feet. This grade occurs in only four places, all being short lines. The minimum grade adopted for the eight-inch sewers is four-tenths of a foot in 100 feet. This grade occurs on only six short lines. All of the above six and eight inch lines, with one exception, have either automatic flush tanks at their upper ends or (in one instance) a catch-basin. The one exception is the six-inch line, 125 feet long, on Carhart avenue, which has a lamphole at its upper end.

The table below gives the minimum and maximum grades in per cent for the various sizes of pipe proposed and the carrying capacities for the minimum grades.

SIZE	Minimum grade	Approximate daily capacity in gallons	Maximum grade
6	0.6	300,000	15.4
8	0.4	550,000	5.56
10	0.2	690,000	4.2
12	0.2	1,050,000	1.4
15	0.2	1,800,000	2.8
18	0.17	2,500,000	0.2
20	0.17	3,800,000	0.25
24	0.1	4,500,000	0.4

The general village map will show where these grades and capacities occur. For intermediate grades it may be stated that doubling the grade increases the carrying capacity approximately 50 per cent. A consideration of the above table with the village map will show to one acquainted with the village and the probable amount of sewage on any street where the street surface water is not cared for that the sizes proposed are ample for all future needs, although the smaller sizes so largely predominate. There are about 15 miles of sewers in the complete system, of which the larger part is in trenches less than eight feet deep.

The smaller sizes of pipe, which are not generally intended to carry surface water, are necessarily considerably larger than any theoretical estimate of the sizes required to carry the sewage would make necessary, and it is for the purpose of keeping clean such pipe that the construction of the 62 flush tanks is recommended for the system. These flush tanks empty automatically, and as often daily as required and adjusted. The admission of roof-water into the sewers is not contemplated, but might be allowed in a few places for flushing the upper ends of the system until such time as the use of those sewers would render unnecessary the admission of the roof-water. Any permit to connect a roof with the system should contain a clause giving the village the right at any future time to require the connection severed. The admission of roof-water might be especially desirable for a time at the few ends of the system where the depth of trench is not sufficient for the insertion of flush tanks, or where the water mains are not sufficiently convenient for the supplying of water to the tanks. There are designed for the system 36 lampholes, into each of which a hose can be inserted for flushing when necessary. These lampholes are used in the place of manholes, for the purpose of inspection, to save the expense of the more costly manholes. They are placed only at the extremity of some of the lines or between two manholes. The flush tanks are also designed with an overflow which answers the purpose of a lamphole. Through the manholes there is thus obtained at any time perfect inspection of the entire bore of the sewers since either a manhole or a lamphole is placed at every change of grade or alignment.

While it is intended to care for the street surface water over a considerable portion of the village, those portions which now have outlets to Choconut creek should have their storm sewers maintained in order not to crowd the proposed system more than is necessary. Future needs will require or can make use of any surplus capacity that the system may have beyond its present pressing needs.

The interceptor "A" from Willow street to Riverside drive is intended to be laid parallel with and about six feet inside of the southerly right-of-way line of the Lackawanna railroad; to the west of Riverside drive it is to be laid seven feet south of the southerly right-of-way line of that railroad. The Broad street outlet for a portion of its length is intended to follow about six feet south of the northerly right-of-way line of the Erie railroad. The ravine between Grand and Floral avenues renders necessary a sewer, designated as interceptor "B," following up the ravine from Cook street to Cherry street. To care for the sewage on that portion of the village between Main street and the Erie railroad and Broad street and Lester avenue another interceptor ("C") is planned which extends through private property from Lester avenue to Broad street. Interceptor "A" will cross under the sewer, now caring for the sewage from the shoe factory and felting works, on the south side of the Lackawanna railroad, where the factory sewer passes under the railroad, and convey its sewage to the treatment works.

Respectfully submitted.

KNIGHT AND HOPKINS
Civil Engineers

MATTEAWAN

Original plans for sewers and sewage disposal

Plans for a system of sewers and sewage disposal for the village of Matteawan, N. Y., were approved by the State Commissioner of Health on June 19, 1903, and comprise:

A contoured sewer map of the village, forming Plate XXXI.

Five sheets of sewer profiles, on file but not published in this report.

A sheet of sewer details, on file but not published in this report.

Three drawings of sewage disposal works, forming Plates XXXII, XXXIII and XXXIV of this report.

Specifications, contract, sewer schedules, letters from the designing engineer and from the makers of sewage distributing apparatus, on file but not published in this report.

NORWOOD

Original sewer plans

Plans for a system of sewers for the village of Norwood were approved by the State Commissioner of Health on May 19, 1903, with the proviso that disposal works will be constructed when required by the State Department of Health. The plans comprise:

A contoured sewer map of the village, dated May 1, 1903, forming Plate XXXV of this report.

A roll of sewer profiles, on file but not published in this report.

A report by D. W. F. Smith, the engineer who prepared the contoured map of the streets and the profiles of the street surfaces, describing the local conditions in the village and the sewer plans, which were entirely remodeled by another engineer before approval.

A report dated May, 1903, from the designing engineer who revised the sewer system, hereto appended.

Notice to bidders, form for proposals, preliminary bond, contract and specifications and affidavit of O. H. Hale, dated April 29, 1903. that the water of the Raquette river, into which the system of sewers at Norwood will temporarily discharge, is not used for domestic purposes below Norwood. These documents are on file but are not published in this report.

To the Honorable Board of Trustees of the village of Norwood, N. Y.:

Gentlemen—In accordance with your instructions, I herewith submit plans and specifications for the system of sewerage for your village and a general statement of the situation and conditions found.

Your village being located upon the east and west sides of the Raquette river, the system naturally divides itself into two sections. As the village in the easterly or main section is located upon the inner slopes of two parallel ridges, with a creek which flows directly into the Raquette river flowing between them, the topography of the section amply cares for its general drainage and storm-water; and because of these conditions the system recommended is that known as the "separate" system and intended for house sewage only.

The population of your village being in 1880 about 1450, in 1890 about 1700 and in 1900 about 1850, and the lots being for the most part five rods front on the streets, and assuming five persons to a family or 10 persons for each 75 feet of pipe or sewer, the system would accommodate many times the present population, as the rate of increase in population for the village is less than 10 per cent. The system as designated is considered and will be ample for the population of your village through many generations. Several of the streets shown on the map are entirely unoccupied, or have at most but one house upon them. Among such are Clark, Morton, Harrison, Cedar, Bicknell, Mill and Town Line, and present indications are that it will be many years before these will be fully developed. Yet this system makes ample provision for these streets whenever they may become occupied.

The water system now being installed by your village will provide ample means for flushing the sewers. supplemented by flush tanks at required points.

These plans provide for the discharge of the sewage by gravity into the Raquette river. This river carries a volume of water second in the State only to the Hudson. The outlets are at points where the current is heavy and is away from the bank, thus carrying the sewage discharge out into the stream. Between Norwood and the discharge of the waters of the river into the St. Lawrence, a distance of about 30 miles, there are but three small villages, none of which take their water supply from the river. The nearest village below Norwood is two and one-half miles distant.

A suitable location for disposal works has been selected as indicated on the map, when it may become necessary to resort to its use in the future, but the construction and maintenance of sewage disposal works at present would entail a heavy tax upon your village already burdened by the cost of a water system which you are now installing.

The sewer at the outlet, for the last 24 feet, is of iron pipe and is carried out into the river below the surface, and the grade increased that the discharge may be entirely beneath the surface of the water.

The north end of Main street and a portion of Clark street, territory not now occupied, will have independent outlets owing to the topography of these sections.

Manholes are placed at all junctions, change of grades and at all intermediate points where needed for flushing or inspection. At dead ends lampholes are placed where there is no manhole or flush tanks. Flush tanks are also placed wherever needed for the proper flushing of the pipes.

Accompanying this report is a map which shows the locations of all streets, the surface of the country included within the bounds of the village by contour lines at each five-foot elevation, the location of the sewers, manholes, flush tanks, lampholes, the size of the pipe, inclination per cent, direction of flow and elevation of invert junction. The profiles show the depth of trenches, size of pipe, per cent of grade, location of manholes and junction of streets, angles or change of grade. Drawings of a manhole, flush tank, lamphole and outlet and copies of the same are included in the specifications. Blank forms for proposals, contract and bond are also included in duplicate.

As stated before, some of the streets included on the map are not opened up and in all probability will not be for several years. For the present and for many years to come there will be required about:

6750 feet of 6-inch pipe, laid ready for use, at 69 cents per foot.
11,410 feet of 8-inch pipe, laid ready for use, at 70 cents per foot.
900 feet of 10-inch pipe, laid ready for use, at $1.10 per foot.
3158 feet of 12-inch pipe, laid ready for use, at $1.25 per foot.
1900 feet of 18-inch pipe, laid ready for use, at $1.17 per foot.
30 manholes or more, $20 each.
14,500 pounds iron for manholes, 2½ cents.
300 feet of lampholes, at 20 cents.
Masonry for outlet and pipe, $100.
Engineering, $600.
Rock excavation, $4 per cubic yard.

Respectfully submitted.

G. W. F. SMITH
Engineer

MAY 20, 1903

To the Village Trustees of Norwood, N. Y.:

Gentlemen—I beg to submit to you herewith the plans for the sewer system of your village which I have had thoroughly revised in my office. As a part of the trunk sewer outlet had been laid when the plans came to me for revision, I have had the new work made to correspond with the work constructed, so as not to sacrifice anything.

The entire system of sewer grades and elevations and diameters has been thoroughly revised and has been based on the assumption that every 50-foot lot within the corporate limits was assumed to have in future a residence or place of business with an average of six persons or twelve persons per 100 feet of street. In addition, some moderate allowance was made for the future extension of the limits and the residences beyond present limits. Each person of the above-estimated number has been assumed to require a water supply, and hence an amount of sewage of 100 gallons per capita per twenty-four hours, and the maximum rate at which this would be discharged, has been assumed at twice the average rate, making the maximum flowing capacity of the sewers equivalent to a flow of 200 gallons per capita per day. In addition to this the sewers have been planned to carry that amount of infiltrated ground-water that experience has shown to be unavoidable in such soil as yours. With both these amounts of water to provide for, we have adopted sizes such as will allow these amounts of sewage and water to be carried in every sewer when flowing only half full.

All changes of alignment, both vertically and horizontally have been made in manholes, so that all sewers are straight between manholes; all parts of the system can therefore be seen and inspected from manholes. The velocities of flow throughout the system has been kept up to suitable values, no velocity being less than 2.2 feet per second when flowing half full, and the same when flowing full should that ever occur. At these velocities there is little chance of either stoppage or sedimentation in the sewers, and hence no flush tanks have been used in the design.

In the matter of discharge of the sewage, the fact that no village, hamlet or city uses the Raquette river below Norwood for water supply, together with the resolution adopted by the trustees agreeing to put in sewage disposal works when called on to do so by the State Commissioner of Health, has warranted me in omitting disposal works for the present, but I have planned the system so that when such works are required the system can be connected to it with but little sacrifice of previous construction. This is accomplished as follows:

At present all sewage on the east side of the river passes down the main trunk across River street to the river between Spring and Park streets.

When disposal works are needed a new sewer will be built from the manhole on trunk line near the railroad northwesterly to and across River street and thence on around the river bank under the railroad bridge to the site selected by your engineer for disposal works. This new sewer will intercept and take into itself the main flow down the trunk sewer, and also the flow on River street flowing south from Park street, and also it will receive the sewage from Spring, Maple, Elm, and Mill streets through a new short sewer running to the railroad manhole from the corner of Spring and River streets. Nearly all the sewage on the east side of the river will thus be diverted to the disposal works. The small amount on River street, between Spring street and the manhole, where the new sewer crosses the river, amounting to about 450 linear feet, will have to go to the river untreated through the present outlet, because it is too low to be intercepted by the future new sewers without pumping, which I have studied to avoid entirely from the system. On the west side of the river the present outlet will be about opposite Park street. When disposal works are built this sewage will be taken across the river through an inverted siphon, joining the east side sewer at a point opposite the end of Park street and flowing thence to the disposal works. All of the proposed future sewers have been worked out as to elevation, grade and diameter, but are shown on the map only in dotted lines instead of full lines as in the case of all other sewers, except the part of the main trunk outlet already built, which I have shown in black. All work planned by me is shown in yellow lines, the original street lines and the surface contours which were furnished to me by you being shown in black lines. This is true of the profiles as well as the map.

The specifications, forms for bidding, bonds, contract, etc., have been carefully worked out and are believed to be suitable to your case, though I would recommend that these be carefully examined by your village attorney. The report submitted by your village engineer has been filed with the plans at Albany. You will understand that in addition to the maps and plans sent you I have also sent one tracing-cloth map, and a full set of tracing-cloth profiles to the State Department of Health at Albany, as well as a full set of the contract, specifications, etc., as is required by law. I have also filed your affidavits as to non-use of the Raquette river below Norwood for potable purposes, and the resolution of the village trustees agreeing to put in disposal works, when required to do so, with the State Commissioner of Health.

You will of course understand that all my work has been based on the elevations of ground surface, contours, street lines and other data furnished me; if these were correctly given the sewer designs are all right, but if errors have crept into the data furnished me, these may or may not seriously affect the suitability of my work according to circumstances. If any such cases should be discovered during construction, the plans should be revised to meet the changes which the discovery may necessitate. I hope that no such case will arise, however, and that your work may progress satisfactorily to an early and favorable conclusion.

I have not thought necessary from my knowledge of the soil at your place to specify any ground-water underdrains. If you should find the soil to be very wet, you can easily add a requirement for lines of drain tile to be laid in the same trenches to aid in carrying off the ground-water. These should vary from three inches to eight inches in diameter, according to the total length of trench they have to drain.

The plans have gone to you by express, prepaid.

Very truly yours,

OLIN H. LANDRETH

Consulting Engineer

PENN YAN

Original plans for sewers and sewage disposal

Original plans for a system of sewers and sewage disposal for the village of Penn Yan, N. Y., were approved by the State Commissioner of Health on June 11, 1903, and comprise:

A contoured sewer map of the village, dated 1903, and forming Plate XXXVI of this report.

A roll of sewer profiles, on file but not published.

A sheet of sewer details, on file but not published.

A drawing of the sewage treatment works, forming Plate XXXVII of this report.

A report of the designing engineers and a memorandum by the same, both appended hereto.

Contract and specifications for the system of sewers and sewage disposal, on file but not published in this report.

PENN YAN, N. Y., SEWERAGE SYSTEM—REPORT

The village of Penn Yan, Yates county, N. Y., is situated at the foot of Lake Keuka and along the outlet, Keuka river, of the lake. It is the county seat of Yates county, and has a population of about 4700. The Keuka river flows in a generally easterly direction from Lake Keuka through the village and into Seneca lake at Dresden. The entire village of Penn Yan is on the drainage area of the river and slopes in a generally northerly and southerly direction toward it. The larger part of the village is on the north side of the river, and along the river are several mills and manufacturing establishments which utilize the fall of the river for the purpose of obtaining power from the water of the lake. The lake is used as a storage reservoir for these mills. The lake is about 20 miles long and has a width varying from one-half a mile to over a mile. The tenth national census report on water-power gives the water surface of the lake as about 20 square miles, and the drainage area at the head of the outlet as

187 square miles, and the mean flow for the year, per second, as 190 cubic feet average for the twenty-four hours. Although this flow, as stated in the report, could not be maintained with uniformity throughout the year unless there is a proper control exercised at the outlet, the dam at the outlet overflows only at intervals of several years, and consequently the control of the run-off from the watershed is quite satisfactory and the flow of the stream comparatively uniform from day to day.

The corporation of Penn Yan has an area of about one and three-quarters square miles. The village is somewhat hilly, causing the sewer grades to be generally excellent.

The northern central division of the Pennsylvania railroad passes through the village and the Penn Yan branch of the Pennsylvania division of the New York Central and Hudson river railroad terminates at Penn Yan.

The village owns its own waterworks, the water of which is pumped from Lake Keuka, a short distance west of the village. The water is pumped to a reservoir on the hill west of the village near the cemeteries, and there distributed to town under a good pressure. The consumption of water is about 300,000 gallons daily. The works were constructed in 1895, and the water is presumably of an excellent quality. It is in general use in the village, affording an excellent revenue, and the consumption is kept down largely by the use of meters.

On account of the use of the water below the village for power and manufacturing purposes, and since the city of Geneva takes a portion of its water supply from Seneca lake, although at a distance of about 20 miles from Penn Yan, it is considered that the sewage of the village before being emptied into Keuka river should undergo a sufficient treatment to prevent any nuisance to the mills and section of country below and to render remote any danger by pollution to the water supply of Geneva.

The plans for the treatment of the sewage contemplate the liquefaction of the organic matter of the sewage in a septic tank, and the further treatment of the tank effluent on contact beds. The septic tank is of a size sufficient for holding eight hours' sewage, based on the quantity of sewage equaling the present water consumption. The overflow from the tank passes to a small receiving basin before being discharged on to the contact beds. In the receiving basin will be placed automatic feeding apparatus for feeding the beds in rotation. There are four beds and the apparatus to be used will so feed the beds in rotation that as soon as one bed is filled the discharge to it will cease and the effluent will be discharged upon the next bed, and so on throughout the series. The discharge of the beds will be by four automatic siphons, one for each bed, so timed as to hold the sewage upon the bed for a required length of time. The discharge from these siphons will be into the drain at the easterly end of the beds, the discharge of which drain will be into the main outlet sewer, and thence into the river. The apparatus for feeding the beds, as well as the siphons for their discharge, it is expected will be purchased by the village from one of the several manufacturers handling such apparatus, and will be installed under the supervision of the engineer by the contractor for the construction of the works. The contact beds are filled to a depth of three feet with stone broken to the specified size, the effluent from the septic tank being turned on to the beds through wooden carriers, and drawn from the beds through tile underdrains to the siphons. The capacity of each bed is designed to hold one-twelfth of the assumed daily flow of sewage, and thus each bed with that flow will be filled, stand full, be emptied, and stand empty three times each twenty-four hours. In figuring the capacity of each bed it is assumed that the voids in the broken stone will eventually become equal to three-eighths of the cubic contents of the beds. It is contemplated and the plans and specifications provide that the sludge which shall accumulate in the bottom of the septic tank and the grit chamber shall be pumped out as occasion requires on to the ground adjoining the pump house, which ground will be prepared for its reception by grading with the surplus excavated material necessarily made in the construction of the works. The sludge, after being pumped out, would then be ploughed under. From the experience of septic tanks it is believed that the amount of sludge that will need to be handled and cared for will be small, and that a large area for these beds will not be necessary, but as the land available at the site selected for the treatment works is quite limited in area. we would recommend the purchase, in addition to the land required for treatment works, of all of the land lying between the railroad and the river, the treatment works and Dake street, and also, if it can be obtained at a reasonable figure, the land lying to the east of the treatment works occupied by the mill now in disuse.

We believe this method of treatment will result in an effluent which will be entirely satisfactory and at a very slight expense for maintenance, and that the treatment works without enlargement will care in an efficient and satisfactory manner for a much larger flow of sewage, or for a very material increase in the population of the village.

On account of the necessity for taking care of street surface water from certain places in the village, nine catch-basins are provided which empty into separate sewers draining to the near-by water-courses. As some of the inlets empty into existing surface-water sewers, the elevations of whose grades is not known, the grades of such surface-water sewers will need to be determined at the time of the construction of the system.

The soil within the village is generally of a sandy or loamy nature, with gravel, and probably in the deep trenches some quicksand. There are some cellars which especially need drainage on account of the level of the subsoil water being high at times. To permanently provide for the drainage of such cellars subsoil drains to the extent of 10,000 feet, of two to four inches diameter, are included in the specifications, to be laid where the lowering of the ground-water is especially desirable. On account of the contour of the ground many of the houses drain their cellars naturally to the open ground, or to adjoining creeks or ravines.

The minimum diameter of sewer adopted for the system is six inches, and the minimum grade for that size is six-tenths of a foot in 100 feet. with one exception. This exception is Henry street, which is a short line of 685 feet, and provided with a flush tank.

The increasing of this grade would increase the cutting along the already quite deep cut for about 1000 feet on East Main street. The grade of six-tenths of a foot in 100 feet for 6-inch sewer occurs in only a few places and for short distances. The minimum grade adopted for 8-inch sewers is four-tenths of a foot in 100 feet, which occurs upon only two short lines.

The table below gives the minimum and maximum grades in per cent for the various sizes of pipe proposed and the carrying capacities for the minimum grades:

SIZE	Minimum grade	Approximate daily capacity in gallons	Maximum grade
6	0.5	300,000	10.8
8	0.4	550,000	7.4
10	0.35	960,000	3.0
12	0.25	1,275,000	0.4
15	0.2	1,950,000	0.3
18	0.15	2,400,000	0.2

The general village map will show where these grades and capacities occur. For intermediate grades it may be stated that doubling the grade increases the carrying capacity approximately 50 per cent. A consideration of the above table with the village map will show to one acquainted with the village and the probable amount of sewage on any street where the street surface water is not cared for that the sizes proposed are ample for all future needs, although the smaller sizes so largely predominate. There are about 14½ miles of sewers in the complete system, of which the larger part is in trenches less than eight feet deep.

The small sizes of pipe, which are not generally intended to carry surface water, are necessarily considerably larger than any theoretical estimate of the sizes required to carry the sewage would make necessary, and it is for the purpose of keeping clean such pipe that the construction of 48 flush tanks is recommended for the system. These flush tanks empty automatically and as often daily as required and adjusted. There are three profiles of the system, profiles one and two covering about 12½ miles of the system, and are those sewers which are intended for immediate construction; profile three covers a trifle over two miles, and are those sewers which are intended for future construction unless it is decided to construct the entire system at one time. On account of the probability of the entire system not being constructed at once, there are 14 flush tanks on profiles one and two which, upon the construction of the sewers covered by profile three, would be changed from flush tanks to manholes by the reconstruction of the bottoms.

The admission of roof-water into the sewers is not contemplated, but might be allowed in a few places for flushing the upper ends of the system until such time as the use of those sewers would render unnecessary the admission of the roof-water. Any permit to connect a roof with the system should contain a clause giving the village the right at any future time to require the connection severed. The admission of roof-water might be especially desirable for a time at the few ends of the system where the depth of trench is not sufficient for the insertion of flush tanks, or where the water mains are not sufficiently convenient for the supplying of water to the tanks.

There are designed for the system 43 lampholes, into each of which a hose can be inserted for flushing when necessary. These lampholes are used in the place of manholes for the purpose of inspection to save the expense of the more costly manholes. They are placed only at the extremity of some of the lines or between two manholes. The flush tanks are also designed with an overflow, which answers the purpose of a lamphole. Through the manholes there is thus obtained at any time perfect inspection of the entire bore of the sewers, since either a manhole or a lamphole is placed at every change of grade or alignment.

The main outlet sewer passes from Main street on the southerly side of the Keuka river down the river, crossing under it by an inverted siphon west of the N. Y. C. depot, and thence easterly on the north side of the railroad to near Dake street, the outlet there crossing under Dake street and thence to the treatment works property. It will be noticed that this outlet is generally laid out upon railroad property which is, we believe, to be decidedly the most practical line. The line avoids so far as possible any interference with the railroad. Between the overhead crossing of the Pennsylvania railroad and Dake street the sewer grade is close to the surface of the ground and the sewer there will require covering. The material for covering, it is expected, will be taken from the surplus excavation at the treatment works, which is only a few hundred feet distant. For a part of this portion of the line the sewer. will need supporting either by masonry piers, a plank foundation or possibly piling, for any one or all of which the specifications provide.

Respectfully submitted.

KNIGHT AND HOPKINS
Civil Engineers

MEMORANDA—PENN YAN SEWERS.

The following eleven houses are believed to be all within the corporate limits not benefited by having swerage facilities:

A.—Five houses on or near the lower end of Hicks street. These are on private property and cannot be sewered into the system without greatly increasing the long deep cut on Dake street, which now approaches at its lower end 20 feet in depth.

B.—One house near the outlet of Lake Keuka on a private lane off South Liberty street. The same reason obtains here as for the houses mentioned under paragraph A.

C.—One house at the extreme western end of Elm street. This house is at the corporation line, and its sewering would necessitate lowering the sewers on Elm, east of Keuka to Prospect, on Prospect to Liberty, on Water to Main, and on Seneca to the outlet, and would involve a large additional and unwarranted expense.

D.—Two farmhouses at the north end of Hamilton street, near the corporation line. These houses are beyond the hollow in Hamilton street and cannot be sewered without making an excessive cut through the Hamilton street hill south of the hollow, the cut through which hill now approaches 14 feet in depth.

E.—Two houses at the north end of Champlin avenue. This is a private street, and to sewer these houses would require excessive cutting on Champlin avenue, Jacob street, the lane between Jacob street and Seneca, and on Seneca street and its outlet.

In addition to the above, sewerage of cellars is not provided for the following houses which have other sewerage facilities.

F.—One low house in the hollow on Benham street, about 200 feet from Jacob. The depth of the trench on this section of Benham street approaches 14 feet in depth. To provide cellar drainage for this house would require deepening the sewer 4 feet on Benham and Jacob streets at an increased cost of $1000.

G.—Several houses on Clinton street, near Jacob's brook. These houses could only be provided with sewerage for the cellars by deepening the Clinton street and Main street lines from Jacob's brook to Seneca street, a distance of about 2000 feet, and at an extra cost of from $4000 to $5000, inasmuch as the Clinton street sewer would need to be lowered 7 feet. These houses can easily and at a reasonable cost provide their own cellar drainage, as we understand they do now, directly to the near-by Jacob's brook.

H.—One house near the north end of Champlin place. This street is a private street, and while this house is provided with sewerage, the drainage of its cellar is not provided for by the system, but can be made westerly to Jacob's brook.

I.—One house on Elm street, west of Burn terrace. The providing of cellar drainage for this house would involve a large additional cost of construction of the Elm, Keuka, Prospect, Water and Seneca street lines. This house can provide its own cellar drainage, if needed, to the open ground to the south on its own property.

J.—One or two houses on Head street, just west of Jacob's brook. These houses can obtain cellar drainage easily and cheaply to Jacob's brook. The providing of drainage for them by the system would necessitate lowering a part of Head street and all of the Jackson street sewer nearly 6 feet at an additional cost of over $2000.

K.—One house on Hicks street at the north end of the sewer. The providing of sewerage for the cellar of this house would involve lowering the whole of the Dake street line from Hicks street to the outlet, a distance of about two-thirds of a mile, which we believe would be unwarranted.

L.—Two houses on Jacob street in the hollow west of Walnut. These houses are provided with sewerage facilities, but their cellars must and can be drained, if necessary, easily and cheaply to the near-by ravine crossing Jacob street.

M.—Two or three houses on Monell street, near the north end of that sewer. The same reason obtains here as given in paragraph K, except that the deepening of the Dake street line, which now approaches 20 feet, would be for a distance of about 1900 feet instead of two-thirds of a mile.

It is evident from the above that the providing of sewerage for the cellars in the houses mentioned in paragraphs F to M inclusive is not warranted generally on account of the convenience of these houses to near-by brooks, or from the fact of the large additional cost which their sewerage would involve upon the expense of the system. These houses number from 12 to 15, and we believe that these exceptions are remarkably few considering the conditions that exist in the contours of the village.

KNIGHT AND HOPKINS
Civil Engineers

PORT CHESTER

Plans for revision and intercepting

The original sewers in the village of Port Chester appear to have been constructed before the enactment of the law requiring the approval of the State Board of Health. Plans for the extension of the system were approved by the State Board of Health on April 27, 1900, and appear in the twenty-first annual report.

Plans for the revision and unification of the system were approved by the State Commissioner of Health on January 22, 1903, and comprise:

A contoured sewer map of the village, showing existing and proposed sewers, dated January, 1903, and forming Plate XXXVIII of this report.

Five sheets of sewer profiles, forming Plates XXXIX, XL, XLI, XLII and XLIII of this report.

Reports from the designing engineer and the consulting engineer, hereto appended.

Contract and specifications, on file but not published in this report.

REPORT ON A GENERAL PLAN OF SEWERAGE FOR THE VILLAGE OF PORT CHESTER, N. Y.

PORT CHESTER, N. Y., *November* 21, 1902

The village of Port Chester is located on the Byram river and Port Chester harbor, at the southeasterly corner of the State of New York. It contains a population of about 9000, the total area of the village being 1500 acres. Along the river front and the New York, New Haven and Hartford railroad are a number of manufacturing plants, several of which are quite extensive. The business portion of the village on Main street is compactly built, the lower floors occupied for business purposes, the upper floors for apartments and tenements. Back of this is the residential section, occupying detached dwellings on lots 50 by 100 feet to one or more acres in extent. The populated portion of the village occupies about one-third of its area, the remainder being vacant lots or farming land.

TOPOGRAPHY

The topography is very irregular and broken, the easterly portion of the village, bounded by the Byram river and Port Chester harbor, being at tide level and other parts of the territory rising to 160 feet above tide. The streets, with a few exceptions, follow the natural surface, few having been graded to any considerable extent.

PRESENT SEWER FACILITIES

A small portion of the more thickly populated part of the village has been sewered in past years, sewers having been constructed in four small districts. The slope of the ground being mainly toward the Byram river, the sewage from nearly all parts of the village will flow to it by gravity.

There are two small districts, however, lying in depressions with intervening ridges from which the sewage must be taken by artificial means. A part of the Brooksville district will require pumping to lift the sewage into the nearest outlet sewer. District No. 4, in which is Washington park, lies in another watershed from which it is proposed to convey the sewage through a tunnel under the dividing ridge, of which South Regent street is nearly the crest. This tunnel will end in Drew street, from which a right-of-way for an outlet into the main sewer in Midland avenue will be required.

SEPARATE SYSTEM

The plan proposes using the separate system for collecting and conducting sewage only. Frequent natural channels, making it practicable to carry off storm-water, moreover the probable necessity of purifying the sewage before entering the river or harbor, which is the natural outlet for the effluent, precludes the reception of storm-water into the sewers.

PRESENT SEWERS AND THEIR OUTLET

The present sewers discharge through outlet sewers in Westchester avenue and Highland street directly into the Byram river. The point of discharge is in the midst of the manufacturing and business part of the village, and at this time some complaint is made because of offensive odors.

It is therefore considered essential to convey all the sewage to a new outlet about one-half mile below the present outlet to a locality especially favorable for purification works, and from which the effluent may discharge into the harbor in a much larger body of water. This outlet is to be reached by a tunnel through the high ground between Purdy avenue and Fox Island road.

MAIN SEWERS

The change in location of the sewer outlet requires the construction of a new main sewer from Wilkins avenue through Main street, Westchester and Travis avenues to Purdy avenue, thence across private property to the proposed location of the purification works.

400 acres of the territory of the village, including the most thickly settled part, lies below an elevation of 50 feet above tide; the river and harbor front is about two (2) miles in extent, therefore a grade necessary to convey the sewage by gravity to the point of outlet brings the sewer at this point to the elevation of low water; consequently the sewage must be pumped at this point in order to give opportunity for its purification and discharge.

HIGH LEVEL INTERCEPTING SEWER

As two-thirds of the area of the village lies above an elevation of 50 feet above tide, it is entirely practicable to intercept the sewage from this territory and by a tunnel under Pearl street, a siphon across the valley between South Main street and Midland avenue, and a tunnel under Armett street and the Fox Island road, discharge it by gravity at the proposed location of the purification works, but the interest on the cost of such a sewer will exceed the cost of pumping this sewage for many years to come.

There will come a time, however, if the present rate of growth of the village continues, when the quantity of sewage to be pumped will justify the construction of such a sewer, therefore this plan anticipates and provides for this contingency.

SIZE OF SEWERS

The size of sewers has been determined on the basis of an ultimate population of 50 persons per acre, allowing 50 gallons per day for each person and double this quantity for maximum flow. The depth of the sewers is made as nearly nine feet as possible; the grades of all lateral sewers are good as shown on the accompanying profiles. Flushing is accomplished by connection with the water mains at dead ends.

PURIFICATION AND DISPOSAL OF SEWAGE

The conditions to be reckoned with at the proposed outlet are these: The harbor is comparatively small and water shallow, except in a restricted channel that has been dredged by the United States government to provide a waterway for vessels drawing 15 feet and under.

The shores of the harbor and sound are occupied by private residences. Surrounded by extensive grounds, there are also hotels and bathing beaches in the vicinity that are largely patronized in the summer. These conditions prohibit the discharge of solid matters in the channel, or floating material that might become stranded and undergo putrefaction along the shores.

It is proposed to receive the sewage as it is pumped from the main sewer into the septic tanks that shall have compartments for intercepting all solid and floating matters, and of sufficient capacity to contain the accumulated sewage for a period of eighteen hours, during which time it will be subjected to bacterial action; provision will be made, however, for governing the length of the period of retention in the tanks, in order to secure the best purification results, as determined by the test of practical experience.

It will then be discharged into the channel of the harbor on the ebb tide, the purification being completed in the water as it is swept out into the sound.

The septic tanks are to be of concrete masonry, including the cover or roof; they will have a vent into the stack of the boiler-house, and the best conditions maintained for the action of an aërobic bacteria.

It is found by experiments with floats that the water going out with the early stages of the ebb tide is carried well out into the sound, little or none returning with the next flood tide; moreover, we are warranted by the report of the latest studies and investigations of the State Board of Health of Massachusetts in the belief that sewage thus treated is rendered innocuous and harmless.

REMARKS

The zero of elevation is approximately half tide, mean high-water as established by the United States government surveys being + 3.70 feet and the difference between high and low water 7.3 feet.

Proposed sewers are shown in a number of cases passing through private property; these follow natural drainage routes, and the sewers must eventually follow approximately those lines, but as the lines shown are not final locations, the profiles are omitted.

Respectfully submitted.

F. S. ODELL

NOVEMBER 21, 1902

To the Honorable the Committee on Water Pipes and Sewers of the Board of Trustees of the Village of Port Chester, N. Y.:

Gentlemen—In compliance with your request I have examined the plans prepared by your engineer, Mr. Frederick S. Odell, C. E., for a comprehensive system of sewerage and sewage disposal suited to the present and future needs of the village of Port Chester. I have visited the entire territory and inspected the existing conditions.

The topography of the territory to be sewered is so irregular that the task of adjusting a system of sewers to the carrying off of the drainage without having excessive cuttings or bad grades has required a great amount of study and a good deal of ingenuity, and I think that it has been very judiciously and successfully accomplished by Mr. Odell.

The plans are so arranged as to utilize the already existing sewers and bring all the sewage down into the Main street sewer which runs nearly parallel to the Byram river and is about the level of high water in the stream. The sewage having been all brought down to the lowest level, the very serious problem of what is to be done with it is encountered.

The sewers now discharge directly into the river, and this is certainly the easiest way of disposing of the sewage from the whole territory.

All the surface drainage from the region back of the narrow ridge along the river shore empties into the river at the foot of Westchester avenue, and this appears to be the natural outlet for the sewers.

A very little consideration shows, however, that such a mode of disposal of the sewage of a population of 15,000 or 20,000 people cannot be thought of for an instant. The point of discharge is just at the height of a curve in the Byram river, a narrow stream with a small natural flow in the dry season, a mile from its mouth, where the tide wave from Long Island sound rises and falls four to six feet and backs the water of the stream up for a mile further. It is about the center of the business part of the village. and both shores of the stream are lined with business and residence buildings. All sanitary considerations forbid the discharge at this point, and there are two others farther up the river which discharge into the stream and create nuisances.

Purification of this sewage before discharge into the stream is not practicable at any point along the river front. Such purification, whether by chemical treatment, sand filtration, or the latest and most promising method, that of septic treatment, requires a considerable area of land and involves under the most favorable circumstances some offence to adjacent property. The occupation of the most valuable business property in the village cannot be permitted for such purpose.

The sewage, therefore, which is collected on North Main street for about half a mile north of Westchester avenue must be carried away, by pumping if necessary, by gravity if possible, to some point where it can be disposed of without causing a nuisance or creating unsanitary conditions.

There is no point to which it can be taken and disposed of by filtration or irrigation. There is no ground suitable for the purpose in the village or near it. For either chemical or septic treatment there is a secluded spot near the shore of the harbor, below the mouth of the river, a little south of Fox island, which seems admirably adapted.

To this point all the sewage from the large area lying south and west of King street and Broadway can be brought by gravity direct. To convey the low-level sewage which is collected on Main street to this point will require either the relaying of about a quarter of a mile of the present Main street sewer on a different grade and the construction of about 900 feet of tunnel, to enable the entire sewage to reach the disposal point by gravity, or else the erection and constant operation of a steam pumping plant on Main street. Inasmuch as a pumping plant will be required at the disposal point at any rate and the laying of a cast-iron pumping main would necessitate the relaying of a portion of the brick pavement in Main street, the gravity plan appears to be preferable.

The method of disposal proposed for the first works constructed is in accordance with the latest practice in this matter. The sewage will all be received in a pump well in the secluded ravine south of the Fox Island road and about a quarter of a mile from the deep-water channel in Port Chester harbor. As received it will be pumped up about 20 feet into a closed concrete tank with chambers so arranged that the sewage will pass through it slowly, taking about eighteen hours in transit, the last chamber having capacity equal to 10 hours discharge of sewage. In passing slowly through such dark chambers it is found that the organic matter in the sewage is attacked by a class of bacteria which thrive only when excluded from light and air and hence are termed anaërobic. The result of their action is that a scum forms on the surface of the liquid, some sludge is deposited on the bottom of the tank, and some of the solids held in suspension disappear entirely. The general result is that the effluent liquid contains only from 50 to 70 per cent as much matter liable to cause offence as was contained in the sewage on entering the tank.

This matter can be entirely removed, it is believed, by passing the effluent liquid through contact beds, as they are called, or filters of crushed stone or coke where the bacteria which need light and air for their work, and hence are termed aërobic, have the opportunity to attack it.

The effluent from the septic tank, however, while not fit to put into a fresh-water stream or any small body of still water, is so far purified that if it is discharged into a large body of flowing salt-water, such as tidal current, no injury or offence can be caused by its presence.

In this case no offence can be created by the passage of the sewage through the closed tank ventilated into the smokestack of the pumping station. It is proposed to connect the last compartment of the tank by a cast-iron pipe with the deepest portion of the tidal channel at the head of the harbor. This connection to be kept closed at all times except for two hours shortly after the turn of the tide, when the gate will be opened and the contents of the last compartment emptied into a strong ebb current and carried out to Long Island sound. As soon as the tank is emptied the gate will be closed again and the compartment allowed to fill.

As for the sludge that may be deposited in the septic tank, it will no doubt have to be cleaned out once in a while. Not much can be predicted as to the amount which will be deposited nor how long it will take to accumulate enough to impair the effectiveness of the tank process. Enough is known, however, with reference to the bacterial action to warrant the belief that the intervals of cleaning will be long and the sludge easy of removal and disposal.

I have no hesitation in approving of the plans as prepared by your engineer.

Very respectfully, your obedient servant,

J. J. R. CROES
Consulting Engineer

STATE TUBERCULOSIS HOSPITAL, RAYBROOK

Plan for a portion of sewage disposal system

On October 20, 1903, the State Commissioner of Health, in accordance with the provisions of section 13-(a) of the Public Health Law, as amended by chapter 383 of the Laws of 1903, approved a plan of a septic tank as a preliminary part of a complete sewage disposal system for the State Tuberculosis Hospital at Raybrook, Essex county, N. Y., with the proviso that the remaining portions would be constructed and ready for use within six months from the date of approval.

The plan for the above septic tank forms Plate XLIV of this report.

SARANAC LAKE

Original plans for the sewer system

Plans for the original sewer system of the village of Saranac Lake were approved by the State Board of Health October 27, 1892, and appear in the thirteenth annual report. The system was built, but owing to faulty construction was unsatisfactory and inefficient and the plans for a new system, utilizing such portions of the old one as were available, were approved by the State Board of Health on December 14, 1898, and appear in the nineteenth annual report. On April 27, 1900, plans were approved by the State Board of Health for several new sewers and for changes in others previously approved, and these appear in the twenty-first annual report.

On December 9, 1903, the State Commissioner of Health approved a plan for an extension of the system to McClellan street. This plan comprises:

A map and profile of the street sewer, forming Plate XLV of this report.

SKANEATELES

Original plans for sewers and sewage disposal

On July 3, 1903, the State Commissioner of Health approved plans for a system of sewers and sewage disposal for the village of Skaneateles which comprise:

A contoured sewer map of the village, forming Plate XLVI of this report.

Four sheets of sewer profiles, on file but not published in this report.

A sheet of sewer details, forming Plate XLVII of this report.

Two drawings of the sewage disposal system, forming Plates XLVIII and XLIX of this report.

A report by the designing engineer of the street sewer system, dated February 14, 1903, hereto appended.

A report from the designing engineer of the sewage disposal plant, hereto appended.

Specifications for the street sewer system, on file but not published in this report.

Specifications for the sewage disposal system, on file but not published in this report.

SKANEATELES, N. Y., *February* 14, 1903

To the Honorable the President and Board of Trustees of the Village of Skaneateles, N. Y.:

Gentlemen—I have the honor to submit herewith a complete design for a system of sewers for the village of Skaneateles. The design includes: (a) A topographical map of the entire village, with 10-foot contours, on which is shown every sewer, manhole, flush tank, lamphole, etc., with the size, rate of grade and direction of flow of each sewer, and the elevation of the sewer invert at each junction, and wherever a change in the rate of grade occurs. The map also shows the location and elevation of all cellars whose depth or distance from the street is such as to make them of especial importance in determining the depth of the sewer.

(b) Four sheets of profiles, showing the profile of the surface of the ground along the line of each sewer, and the relative location of the sewer invert, with elevations, rates of grade and sizes of sewers, and location of all structures.

(c) One sheet of detail plans for manholes, flush tanks and other structures.

(d) Contractor's specifications for the construction of the system.

(e) Engineer's report. together with a duplicate or copy of each of the above, for filing with the State Board of Health.

The elevations on these plans are referred to a datum plane which is 800 feet above tidewater. The initial bench-mark used in the survey being a copper bolt, set in the west wing-wall of the State dam by the United States Geological Survey, and marked "867 ft. U. S. G. S." The elevation of this bench was taken as 67 feet. All distances are given in feet and decimals of a foot.

The design is for a system of house sewers only (sometimes called a separate system) no provision being made for taking care of storm-water, though a certain amount of ground-water, such as collects in cellars, may be admitted without overtaxing the capacity of the sewers. It contemplates the concentration of the sewage from the entire village at the intersection of West Elizabeth and Griffin streets, whence it is to be conveyed through a 15-inch outfall sewer, across lands of Thomas Spearing, to a point on the bank of Skaneateles creek, into which the crude sewage may be discharged directly, or where, if deemed necessary, it may be subjected to bacterial treatment in a septic tank, the effluent from the same being discharged into the creek. The sewage from the portion of the village lying east of the creek is to be carried across the same, under Elizabeth street bridge, in a cast-iron pipe, properly trussed, and supported by the abutments of the bridge.

EAST STREET

No provision has been made in this design for any sewer in the extreme northerly portion of East street, from the summit of the hill to the corporation line—a distance of about 500 feet. The drainage from this portion of the street could be carried to the northerly limits of the village, and thence across private property to the Syracuse street sewer, and discharged into the same. But it seems probable that by the time there is any demand for sewerage in this sparsely settled region new streets will have been opened, connecting East and Syracuse streets, through one of which this sewage could be carried. I have therefore deemed it unwise to plan a sewer through private property at this time for the accommodation of such a limited territory, where there will probably be no demand for a sewer for many years to come.

EAST LAKE STREET

The sewage from the greater portion of East Lake street will have to be carried to the southerly limits of the village, as the grade of the street falls sharply in that direction. From this point it will be brought back across private property and discharged into the East Genesee street sewer at Leitch avenue. The approximate location and grade of this sewer are shown upon the plans. There are but few houses on this portion of East Lake street at present, and there may not be any demand for a sewer there for some time to come. I would recommend, however, that the lower portion of the return sewer be built at once to a point on the property of Mr. Frederick Roosevelt, at which the sewage from his house (which now goes to or towards the lake) can be intercepted, as the sewer in East Genesee street will not be deep enough to properly serve this house. The residence of Miss Fitch will also be better served by this sewer than by the one in the street.

WEST LAKE STREET

At the southerly end of West Lake street a similar problem presents itself, but one not so easily solved. From the main entrance of Mr. Samuel Roosevelt's place to the south corporation line the grade of this street falls 18 feet. To bring the sewage back against the grade would involve a cut of about 26 feet at the summit of the hill. Furthermore, a high ridge extending along the east side of the street, between it and the lower land sloping toward the lake, makes it even more difficult to bring the sewage back by gravity through private property, as in the case of East Lake street above cited. To accomplish this without very deep cutting it would be necessary to carry the return sewer some distance south of the corporation limits and cross the ridge at a point south of the residence of Mr. Beebe. This would involve considerably more expense than the construction of a sewer against the grade in the street itself. I have planned, therefore, for the installation, at the southerly end of West Lake street, of a sewage lift or pump to raise the sewage from this portion of the street to the top of the ridge, at a point on the lands of Mr. Fitzgerald, just south of the corporation line. Thence it will be brought back by gravity through a 6-inch sewer, across private property (as shown on the map) and discharged into the West Lake street sewer, near the residence of Mr. Thomas Prentiss. This sewer will give better service to the clubhouse known as "Mingo Lodge", and to the residences of Mr. Roosevelt and Mr. Hanna than that in the street, and it will directly intercept the drainage from these places as now disposed. I would therefore recommend that this return sewer be carried far enough for that purpose at once. The one in the street and the lift need not be put in until the west side of the street (now unoccupied) is built up sufficiently to create a demand for it.

In general, the sewers have been planned to be about eight feet below the present surface of the streets in order to give good drainage to all cellars. But in some places a greater depth has been found to be necessary, either for this purpose or in order to obtain the required fall for the sewer. Also it will be seen that there are low points in Griffin street and West Elizabeth street, where the depth of the sewer will be only about 3 to 3½ feet. A greater depth could not be obtained without bringing the sewage to the outlet at too low a grade to be discharged into the creek by gravity. At both of these points, however, the surface grade of the streets should unquestionably be raised, as a glance at the profile will show. and I recommend that this be planned for when the sewers are built.

At another low point, in West Lake street, the sewer will be a little less than 5 feet deep, and cannot be placed low enough to drain the cellars of Mr. Holben and Mr. Allen, at the least rate of grade which should be given to a house connection. It is, nevertheless, deep enough to receive the *sewage* from these houses, and the cellars are already provided with adequate relief from ground-water by an existing drain to the lake.

The estimated quantity of sewage for which the system is designed is nearly 955,000 gallons per day from the entire village. This allows for 150 gallons per capita, from a population of 6366, or a family of four persons to each 50-foot lot, on all streets now existing or proposed. The census returns for the past thirty years give the population of the village as follows:

1870	1409
1880	1669
1890	1559
1900	1495

It will be seen from this that Skaneateles can hardly be classed as a growing village. And I am unable to see any cause which might have a tendency to make it one in the future, unless it be an increasing popularity as a summer resort. I therefore consider the above estimate sufficient to obviate any possibility of the capacity of the system proving inadequate during the life of the sewers, especially as none of them is planned to run more than two-thirds full. A smaller estimate, on the other hand, would make very little difference in the design, as most of the sewers are only 6 inches and 8 inches, the minimum sizes permissible in any case.

DISPOSAL

The question of ultimate disposal of the sewage has been given considerable study. The Skaneateles creek, which is the natural drainage outlet of the village, can in no sense be classed as a potable stream. The existence upon its banks of many paper, woolen, and other mills, all discharging their refuse into its waters, effectually precludes any such classification. It remains then to determine whether the discharge of this sewage into the creek would be likely to create a nuisance.

For the past eight years the city of Syracuse has taken careful gaugings of the flow of the creek, at a weir especially constructed for this purpose at Willow Glen, about a mile below the village. These measurements show the ordinary minimum flow to be about forty million (40,000,000) gallons per day, and the absolute minimum (except during rare periods of short duration, when some special circumstances necessitated a temporary closing of the gâtes in the dam) to be about 10,000,000 gallons per day. The maximum flow is over one hundred million (100,000,000) gallons, and it is usually near this figure during the greater part of the year, when the Erie canal is in operation, the creek being used as a feeder for the canal.

At 150 gallons per capita the present population of the village would yield less than 250,000 gallons per day. A flow of 40,000,000 gallons (which I believe can be safely counted upon, except during unusual periods of drought) would give this quantity of sewage a dilution of 160 volumes, and even during dry seasons a dilution of at least 40 volumes could be expected. This would appear to be sufficient to prevent a nuisance, since in the case of the River Exe, " It was found, in 1895, that the addition of sewage to 40 times its volume of water made no serious alteration in the chemical or physical quality of the stream " (A. P. Folwell on Sewerage). It is regarded as safer, however, to consider the number of individuals contributing the sewage rather than its volume, as the proportion of water contained varies considerably. In this connection various authorities place the minimum amount of dilution necessary to prevent the creation of a nuisance at from 1500 to 3500 gallons per capita per day. Taking the larger figure, and assuming the present population of the village to be 1600, we would require a flow in the creek of only five million six hundred thousand (5,600,000) gallons per day, if every house were connected with the sewers, while the minimum dry weather flow is nearly twice that amount.

I feel justified, therefore, in recommending that for the present the sewage be discharged directly into the creek. If, however, this method of disposal should be found objectionable, either now or in the future, a septic tank should be constructed and the sewage be purified therein before allowing it to enter the stream.

A convenient site for the septic tank would be on the premises of Mr. H. C. DeWitt, immediately adjacent to the outlet shown on the map. The invert in the last manhole should be constructed with a turn to the west, to facilitate this change, should it become necessary.

No attempt has been made to plan the details of the lift which is proposed for the southerly end of West Lake street, as decided improvements in such devices may be made before its installation becomes necessary. As conditions are at present it would probably be most advantageous to employ what is known as the "Adams Sewage Lift", which could be operated by pressure from the village water system. The consumption of water would be equal to the quantity of sewage to be raised, which would be quite small, being contributed by such a limited territory. Or, a small pump might be employed, driven by an electric motor, the power being furnished from the municipal electric lighting plant. A motor of one-half horsepower would probably be sufficient, and the expense of operation would be trifling. The objection to this plan lies in the fact that the village dynamos are run only 10½ to 14 hours out of each 24. A storage basin would consequently be required, in which the sewage could accumulate when the pump was not working. This would not only add to the expense of construction, but might prove objectionable if located too near a dwelling.

As stated above, this plan makes no provision for taking care of storm-water. To do so much larger sewers would be required, and the expense of construction would be proportionately greater. The present method of caring for storm-water, while manifestly inadequate, still serves the purpose fairly well, except during very heavy storms. The water must then remain in the street gutters until these small drains are able to carry it off. One of these drains, however, to which my attention has been especially called, appears to be particularly unequal to the duty which is laid upon it. I refer to the one which crosses private property between State and Jordan streets and discharges just above the dam. It is either too small, or has become badly clogged, as the water in it backs up every spring and floods the cellars which are connected with it. I have measured its watershed and its fall, and find that a 24-inch pipe, laid to a true grade along this line, or near it, would give all the service required of the present drain. I therefore recommend that attention be given to this matter when the sewer system is being constructed, as the work could be included in the sewer contract at a comparatively trifling increase in the cost of the same.

None of the existing drains above referred to (though dignified by some with the title of sewers) has been constructed in such a manner as to warrant its being included in the design herewith submitted.

Very respectfully,

FREDERICK M. THOMAS

Designing Engineer

SKANEATELES SEWAGE DISPOSAL PLANT—GENERAL DESCRIPTION OF PLANT

The work required will comprise the following items:

1. The proposed plant will comprise a septic tank built underground with concrete walls and roof of the capacity sufficient to detain the sewage estimated to be furnished by the village for a period of about ten hours. The tank will be provided with a grit chamber through which the sewage will pass before entering the septic tank proper, which chamber is intended to detain the mineral matter only. There will also be an affluent chamber and a valve chamber, with piping and fittings so arranged as to shut off the sewage from entering the septic tank proper and divert it directly into the stream whenever it becomes necessary to pump out the septic tank. The piping system will also include piping and fittings by which either of the three minor chambers and the large septic tank can be pumped out by means of a small centrifugal pump driven by a gasoline engine placed in the gate-house over the gate chamber.

It is intended that the affluent from the septic tank shall pass directly into the stream for the present; and it is believed that this degree of purification will be adequate for a long time if not permanently. Should further purification, however, be required in future, the septic treatment would still be the necessary preliminary to such further purification.

The action of the septic tank being to liquify the organic solids of sewage, there will result as the products of the action of the tank three distinct materials; first, a small amount of gas, chiefly marsh gas, which will be distributed through the ventilating system and which will be almost entirely odorless; second, a large amount of liquid affluent not thoroughly purified but sufficiently reduced in chemical character to warrant its discharge into the outlet with safety; third, a small amount of mineral residue precipitated to the bottom of the tank. This latter portion, comprising a very small proportion of the total sewage treated, will require removal about once a year, and it is proposed to accomplish this by pumping it into the sludge bed to be located north of the septic tank, from which bed the liquid matter may filter through coarse screening material into the outlet. The remaining mineral matter when dry will resemble a rich soil and can be removed wherever required without objection whatever.

SCHEDULE OF WORK CALLED FOR

The work required will comprise the following items:

First, the septic tank proper with its inlet and outlet chambers and valve chamber and with all piping, fittings and accessories, including centrifugal pump and gasoline engine. The piping will include the length of iron inlet pipe through the wall and the iron outlet pipe extending from the affluent chamber to the outlet at the bank of the stream. The piping will also include the wrought-iron pipe extending from the centrifugal pump to the sludge bed with its fittings; second, the building over the inlet, outlet and valve chambers complete as shown on drawing No. 2 and in these specifications; third, the sludge bed shown on drawing No. 1 and described in these specifications.

Specifications on file in State Department of Health but omitted from this annual report.

WEEDSPORT

Original plans for sewers and sewage disposal

Original plans for a system of sewers and sewage disposal for the village of Weedsport were approved by the State Commissioner of Health on September 29, 1903, and comprise the following:

A contoured sewer map of the village, forming Plate L of this report.

A sheet of sewer profiles, forming Plate LI of this report.

A drawing of the septic tank of the proposed disposal system, forming Plate LII of this report.

A sheet of sewer details, showing special culvert under Erie canal, forming Plate LIII of this report.

A sheet of sewer details, on file but not published in this report.

A map of buildings on Seneca street, on file but not published in this report.

A report by the designing engineer, dated August 5, 1903, hereto appended.

Instructions to bidders, contract and specifications, on file but not published in this report.

NEW YORK, *August* 5, 1903

The Honorable Board of Trustees, Village of Weedsport, N. Y.:

Gentlemen—I submit herewith the following report on the proposed sanitary sewerage system for the village of Weedsport, accompanied with plans, profiles, specifications, etc., all in duplicate.

Weedsport, Cayuga county, N. Y., is situated on the New York Central, the West Shore and the Lehigh Valley railroads, and also on the Erie canal, about 20 miles west of Syracuse. The village as incorporated comprises an area of about one square mile. The population census of 1890 was 1580 and of 1900 was 1525. Assessed valuation of village is about $900,000. Water is supplied through gravity system by the Weedsport Water Company, a private corporation. Electric light and gas are supplied by private companies.

The village has a good healthy location; the surface slopes to the north toward the Seneca river. It is traversed by several natural waterways, and the surface drainage can easily be taken care of by the present street drains, which may be improved by a few minor changes.

The sanitary sewerage system proposed is what is known as the separate system, which receives only water-closet and kitchen drainage, and no surface water or underdrainage is to enter sewers except cellar drainage.

The system is designed on a basis of 30 persons to each 100 feet of sewer, each person using 100 gallons of water per day and sewers discharging in 16 hours running one-half full. The outlet, which has no house connection, would run more than half full with the maximum flow. This provides for a future population of over 14,000.

The plans show the topography, all the streets, the street drains, water pipes, etc., the sizes and location of all proposed sewers, disposal works, flush tanks, manholes, lampholes, etc., with their grades and the details of construction. The profile sheet shows the elevations of the lowest cellars, almost all of which can drain into the sewers. All sizes of sewers are 8 inches unless otherwise noted.

Flush tanks are placed at the beginning of sewers; they automatically discharge from 150 to 350 gallons of water once every 24 hours to flush out the sewers. I furnish you with a plan of the Van Vranken flush tank in case you want to use it, as it is slightly cheaper, but I recommend the Miller flush tank, Potter design, which has a removable cover in the top of the siphon so the flush tank can be used as a manhole for inspecting and cleaning the sewers. Manholes are placed at intersections of sewers or at intervals of about 300 feet along the sewer or at changes in direction or grade. They are built so a man can enter to inspect and clean sewers and are also for ventilation. Lampholes are built intermediate to save expense of manholes, and are for inspection or to admit a hose for flushing. If the sewers are properly constructed and care observed in the maintenance there ought to be few stoppages, and the annual expense of maintenance would be small.

The best and cheapest outlet is through the culvert under the Erie canal near the center of the village. During the canal improvement of 1897 it was necessary to rebuild the old timber culvert, which was three feet wide by twenty inches high. A sewerage system was contemplated at that time, and the State authorities enlarged the new culvert to four feet wide by 3.2 feet high to provide room for a sewer outlet. As the only drainage into the culvert is through a 20-inch pipe and the remaining area of culvert with sewer through it would be nearly twice the original area, I think the State authorities will not object to the 15-inch cast-iron pipe running through culvert. Otherwise it would be necessary to cut through the canal banks at much extra expense.

The outlet empties into Cold Spring brook about 2200 feet west of the Erie canal. The ordinary flow of this stream is 30 to 40 cubic feet per second and low-water flow of 20 cubic feet per second, which would furnish sufficient dilution for the effluent from septic tank for the present population of 1500 without being objectionable. But in the future the village might be liable for damages to riparian owners and would be obliged to construct purification works when ordered by the State Board of Health.

As it would be a considerable additional expense to construct filter works now, and it might delay the construction of the sanitary sewers, I think that the State Board of Health will consent to approve the present plans for a septic tank to be built now and further purification works to be constructed when ordered by them.

The outlet is shown straight from the culvert to the brooks, but it may run along the ditch if you can get a better right-of-way. The septic tank is shown about 500 feet from the brook, but it may be anywhere along the outlet. It should be far enough away from the brook to avoid floods and far enough away from the village to be unobjectionable. Yet property owners need not be alarmed by the presence of the septic tank, as it is air-tight and would be no nuisance even if it were much nearer the village.

The whole system comprises about 33,000 feet of sewers, but it would only be necessary to construct sewers at present between North street and the West Shore railroad. Extensions may be easily made at any time. By issuing long-term loans and constructing all the sewers now for the main part of the village, you will have all the advantages of sanitary sewers at a comparatively small annual expense.

There are various methods of paying for sewers, either by a general tax or by local assessments, according to frontage, area, or valuation, or a combination of these. As the outlet sewers the entire village, I would advise that the outlet and disposal works be paid for by a general tax according to assessed valuation, and the remaining sewers paid for by local assessments according to frontage and area.

Respectfully submitted.

E. H. THOMAS, C. E.
Designing Engineer

RULES AND REGULATIONS

FOR THE

SANITARY PROTECTION OF WATER SUPPLIES

COLD SPRING

Rules and regulations for the protection from contamination of the public water supply of the village of Cold Spring, N. Y., enacted by the New York State Department of Health under chapter 661 of the laws of 1893 and chapter 251 of the laws of 1899

Abstract of the Public Health Law providing for the Protection from Contamination of Public Water Supplies. Chapter 661 of the Laws of 1893, as amended by Chapter 251 of the Laws of 1899.)

Section 70. The State Board [Department] of Health may make rules and regulations for the protection from contamination of any or all public supplies of potable waters and their sources within the state. If any such rule or regulation relates to a temporary source or act of contamination, any person violating such rule or regulation shall be liable to prosecution for misdemeanor for every such violation, and on conviction shall be punished by a fine not exceeding two hundred dollars, or imprisonment not exceeding one year, or both. If any such rule or regulation relates to a permanent source or act of contamination, said board may impose penalties for the violation thereof or the non-compliance therewith, not exceeding two hundred dollars for every such violation or non-compliance. Every such rule or regulation shall be published at least once in each week, for six consecutive weeks, in at least one newspaper of the county where the waters to which it relates are located. The cost of such publication shall be paid by the corporation or municipality benefited by the protection of the water supply to which the rule or regulation published relates. The affidavit of the printer, publisher or proprietor of the newspaper in which such rule or regulation is published may be filed, with the rule or regulation published, in the county clerk's office of such county, and such affidavit and rule and regulation shall be conclusive evidence of such publication, and of all the facts therein stated, in all courts and places.

Section 71. The officer or board having by law the management and control of the potable water supply of any municipality, or the corporation furnishing such supply, may make such inspection of the sources of such water supply as such officer, board or corporation deems it advisable, and to ascertain whether the rules or regulations of the State Board [Department] are complied with. If any such inspection discloses a violation of any such rule or regulation relating to a permanent source or act of contamination, such officer, board or corporation shall cause a copy of the rule or regulation violated to be served upon the person violating the same, with a notice of such violation. If the person served does not immediately comply with the rule or regulation violated, such officer, board or corporation shall notify the State Board [Department] of the violation, which shall immediately examine into such violation; and if such person is found by the State Board [Department] to have actually violated such rule or regulation, the secretary [commissioner] of the State Board [Department] shall order the local board of health of such municipality to convene and enforce obedience to such rule or regulation. If the local board fails to enforce such order within ten days after its receipt, the corporation furnishing such water supply or the municipality deriving its water supply from the waters to which such rule or regulation relates, may maintain an action in a court of record, which shall be tried in the county where the cause of action arose against such person, for the recovery of the penalties incurred by such violation, and for an injunction restraining him from the continued violation of such rule or regulation.

Section 72. Sewerage.—When the State Board [Department] of Health shall, for the protection of a water supply from contamination, make orders or regulations the execution of which will make necessary or require the construction and maintenance of any system of sewerage, or a change thereof, in or for any village or hamlet, whether incorporated or unincorporated, or the execution of which will require the providing of some public means of removal or purification of sewage, the municipality or corporation owning the water works benefited thereby shall, at its own expense, construct and maintain such system of sewerage or change thereof, and provide such means of removal and purification of sewage and such works or means of sewage disposal as shall be approved by the State Board [Department] of Health. When the execution of any such regulations of the State Board [Department] of Health will occasion or require the removal of any building or buildings, the municipality or corporation owning the water-works benefited thereby shall, at its own expense, remove such buildings and pay to the owner thereof all damages occasioned by such removal. When the execution of any such regulation will injuriously affect any manufacturing or industrial enterprise which is not a public nuisance, such municipality or corporation shall pay all damages occasioned by the enforcement thereof. Until such construction or change of such system or systems of sewerage, and the providing of such means of removal or purification of sewage and such works or means of sewage disposal, and the removal of any building, are so made by the municipality or corporation owning the water-works to be benefited thereby at its own expense, there shall be no action or proceeding taken by such municipality or corporation against any person or corporation for the violation of any regulation of the State Board [Department] of Health under this article, and no person or corporation shall be considered to have violated or refused to obey any such rule or regulation. The owner of any building the removal of which is occasioned or required, or which has been removed by any rule or regulation of the State Board [Department] of Health made under the provisions of this article, and all persons whose rights of propriety are injuriously affected by the enforcement of any such rule or regulation, shall have a cause of action against the municipality or corporation owning the water-works benefited by the enforcement of such rule or regulation, for all damages occasioned or sustained by such removal or enforcement, and an action therefor may be brought against such municipality or corporation in any court of record in the county in which the premises or property affected is situated and shall be tried therein; or such damages may be determined by a special proceeding in the supreme court or the county court of the county in which the property is situated. Such special proceedings shall be commenced by petition and notice to be served by such owner upon the municipality or corporation in the same manner as for the commencement of condemnation proceedings. Such municipality or corporation may make and serve an answer to such petition as in condemnation proceedings. The petition and answer shall set forth the claims of the respective parties, and the provisions of the condemnation law shall be applicable to the subsequent proceedings upon the petition and answer, if any. Either party may, before service of the petition or answer respectively, offer to take or pay a certain sum, and no costs shall be awarded against either party unless the judgment is more unfavorable to him than his offer.

RULES AND REGULATIONS

The following rules and regulations shall apply to the reservoirs belonging to the public water supply of the village of Cold Spring, Putnam county, New York, situated on the stream known as Foundry brook and to all water courses entering or ultimately discharging into the said reservoir. The term "reservoir" whenever used in these rules is intended to mean and comprise every natural or artificial reservoir, lake or pond which stores or detains water that enters or may enter the public water supply of the village of Cold Spring. The term "watercourse" wherever used in these rules is intended to mean and comprise every spring, stream, ditch, gutter or other watercourse of any kind, the waters of which when running, whether constantly or occasionally, eventually flow, or may flow, into the public water supply of the village of Cold Spring.

PRVIIES ADJACENT TO RESERVOIRS OR WATER-COURSES

(1) No privy, privy vault, pit, cesspool, or any other receptacle of any kind used for either temporary storage or the permanent deposit of human excreta shall be constructed, placed or maintained with its nearest point within fifty (50) feet, horizontal measurement of the highwater mark of any reservoir, or of the edge, margin or precipitious bank of any watercourse of the Cold Spring supply.

(2) No privy, privy vault, pit, cesspool or any other receptacle used for the permanent deposit of human excreta shall be constructed, located, placed or maintained with its nearest point within two hundred (200) feet horizontal measurement of the water line of any reservoir of the Cold Spring water supply, or within one hundred fifty (150) feet, horizontal measurement of the edge, margin or precipitous bank of any watercourse of the Cold Spring water supply.

(3) Every privy, privy vault, pit, cesspool or other receptacle or place used for the temporary storage of human excreta which is constructed, located or maintained within the aforesaid two hundred (200) feet, horizontal measurement of the high water mark of any reservoir, or within the aforesaid one hundred fifty (150) feet, horizontal measurement of the edge, margin or preciptious bank of any watercourse of the Cold Spring water supply, from which privy or other receptacle the excreta are not at once removed automatically by means of suitable water-tight pipes or conduits to some proper place of ultimate disposal, as hereinafter provided, shall be arranged in such manner that all such excreta shall be received temporarily in suitable vessels or receptacles which shall at all times be maintained in an absolutely water-tight condition and which will permit of convenient removal to some place of ultimate disposal as hereinafter set forth.

(4) The excreta collected in the aforesaid receptacles shall be removed and the receptacles thoroughly cleansed and deodorized as often as may be found necessary in order to maintain the privy

in proper sanitary condition and to effectually prevent any overflow upon the soil or upon the foundations or floor of the privy. In effecting this removal the utmost care shall be exercised that none of the contents be allowed to escape while being transferred from the privy to the place of disposal hereinafter specified, and that the contents, while being transferred from the privy to the place of disposal, shall be thoroughly covered and that the least possible annoyance and inconvenience be caused to occupants of the premises and the adjacent premises.

(5) Unless otherwise specifically ordered or permitted by the State Board (Department) of Health, the excreta collected in the aforesaid receptacles shall, when removed, be disposed of by burying in trenches, or by thoroughly digging it into the soil in such place and manner as to effectually prevent them being washed over the surface of the ground by rain or melting snow, and at distances not less than three hundred (300) feet, horizontal measurement, from the high-water mark of any reservoir, or not less than two hundred (200) feet from the edge, margin, or precipitous bank of any water-course of the Cold Spring water supply.

(6) Whenever it shall be found that owing to the character of the soil or of the surface of the ground, or owing to the height or flow of sub-soil, or surface water, or other special local conditions, the excremental matter, from any privy or aforesaid receptacle, or from any trench or place of disposal may, in the opinion of the State Commissioner of Health be washed over the surface or through the soil into any reservoir or watercourse, then the said privy or receptacle for excreta or the said trench or place of disposal shall, after due notice to the owner thereof, be removed to such greater distance or to such place as shall be considered safe and proper by the State Board (Department) of Health.

SEWAGE, HOUSE SLOPS, SINK WASTE, ETC.

(7) No sewage or excremental matter from any water-closet, privy or cesspool shall be led, conducted, or discharged by any pipe, drain or ditch into any reservoir or watercourse of the Cold

Spring water supply, nor shall any such matter be placed, led, discharged or allowed to escape onto the surface of the ground or into the ground below the surface within three hundred (300) feet, horizontal measurement, from the high water mark of any reservoir, or within two hundred (200) feet, horizontal measurement of the edge, margin or precipitous bank of any watercourse of the Cold Spring water supply.

(8) No garbage, putrescible matter, house slops, bath waters, kitchen or sink waste, refuse or waste water from creameries, cheese factories, laundries, nor water in which milk cans, utensils, clothes, bedding, carpets or harnesses have been washed or rinsed, nor any polluted water or liquid of any kind shall be thrown or discharged directly or indirectly into any reservoir or watercourse of the Cold Spring water supply. Nor shall any such liquid or solid refuse or waste be thrown or discharged upon the surface of any ground or into the ground below the surface in any manner whereby the same may flow into any reservoir or watercourse of the Cold Spring water supply within one hundred (100) feet, horizontal measurement, of the edge, margin or precipitous bank of any watercourse of the Cold Spring water supply.

(9) No clothing, bedding, carpets, harness, vehicle, receptacles, utensils, nor anything that pollutes water shall be washed, rinsed or placed in any reservoir or watercourse of the Cold Spring water supply.

BATHING, ANIMALS, MANURE, COMPOST, ETC.

(10) No person shall be allowed to bath in any reservoir or watercourse of the Cold Spring water supply, nor shall any animals or poultry be allowed to stand, wade or swim in said reservoir or watercourse, nor be washed therein.

(11) No stable for cattle or horses, barnyard, hog-pen, poultry house or yard, hitching place or standing place for horses or other animals, manure pile nor compost heap shall be located, placed, maintained or allowed to remain with its nearest point less than one hundred fifty (150) feet, horizontal measurement, from

high-water mark of any reservoir, or less than seventy-five (75) feet, horizontal measurement, from the edge, margin or precipitous bank of any watercourse of the Cold Spring water supply, and none of the above-named objects or sources of pollution shall be so located, placed, maintained, or allowed to remain that the drainage, leachings, or washings from the same may enter any reservoir or watercourse of the Cold Spring water supply, without first having passed over or through such an extent of soil as to have been properly purified, and in no case shall it be deemed that proper purification has been secured unless the above drainage, leachings or washings shall have percolated over or through the soil in a scattered, dissipated form, and not concentrated in perceptible lines of drainage, for a distance of not less than one hundred and fifty (150) feet before entering any reservoir, nor less than seventy-five (75) feet before entering any watercourse of the Cold Spring water supply.

(12) No human excrement or compost containing human excrement shall be placed, piled or spread upon the ground, or dug or buried in the soil within a distance of three hundred (300) feet from the high-water line of any reservoir, nor within a distance of two hundred (200) feet from the edge, margin or precipitous bank of any watercourse of the Cold Spring water supply, and no manure or compost of any kind shall be placed, piled or spread upon the ground within one hundred and fifty (150) feet of the high-water line of any reservoir, nor within seventy-five (75) feet of the edge, margin or precipitous bank of any watercourse of the Cold Spring water supply.

(13) No decayed or fermented fruit or vegetables, cider mill waste, roots, grain or other vegetable refuse of any kind shall be located, placed, maintained or allowed to remain in such places that the drainage, leachings, or washings therefrom may flow by open, blind or covered drains or channels of any kind into any reservoir or watercourse of the Cold Spring water supply without first having passed over or through such an extent of soil as to have become properly purified, and in no case shall it be deemed

that sufficient purification has been secured unless the above-mentioned drainage, leachings or washings shall have percolated over or through the soil in a scattered, dissipated form, and not concentrated in perceptible lines of drainage for a distance of not less than one hundred (100) feet before entering any reservoir, or a distance not less than fifty (50) feet before entering any watercourse of the Cold Spring water supply.

DEAD ANIMALS, OFFAL, MANUFACTURING WASTE, ETC.

(14) No dead animal, bird, fish or any part thereof, nor any offal nor refuse from and slaughter house, nor any decomposable or putrescible refuse or waste matter of any kind shall be thrown, placed in or allowed to pass into any reservoir or watercourse of the Cold Spring water supply, nor shall any such material or refuse be so located, placed, maintained or allowed to remain that the drainage, leachings or washings therefrom may reach any reservoir or watercourse of the Cold Spring water supply without first having percolated over or through the soil in a scattered, dissipated form, and not concentrated in perceptible lines of drainage, for a distance of not less than one hundred and fifty (150) feet before entering any reservoir, and not less than one hundred (100) feet before entering any watercourse of the Cold Spring water supply.

PENALTY

(15) In accordance with section seventy of chapter six hundred sixty-one (661) of the laws of 1893, as amended by chapter two hundred fifty-one (251) of the laws of 1899, the penalty for each and every violation of, or non-compliance with, any of the above rules and regulations which relate to a permanent source or act of contamination is hereby fixed at two hundred dollars ($200).

The foregoing rules and regulations for the protection from contamination of the public water supply of the village of Cold Spring, N. Y., were duly made, ordained and established on February 10, 1903, pursuant to chapter six hundred sixty-one

(661) of the laws of the State of New York for 1893, as amended by chapter two hundred fifty-one (251) of the laws of the State of New York for 1899.

DANIEL LEWIS
Commissioner of Health

Albany, N. Y., February 10, 1903.

These rules and regulations, to be operative and valid, must first be published at least once each week for six consecutive weeks in at least one newspaper in Putnam county, N. Y., and the affidavit of the printer, publisher, or proprietor of the newspaper in which such publication is made, that the publication was so made, together with a copy of the rules and regulations must be filed with the county clerk.

The cost of such publication, affidavit and filing must be paid by the village authorities of Cold Spring, N. Y.

ALBANY, *February* 14, 1903

The Cold Spring Recorder, Cold Spring, N. Y.:

Gentlemen—I enclose herewith for publication in the Cold Spring Recorder, in compliance with the provisions of section 70 of the Public Health Law, rules and regulations for the protection from contamination of the public water supply of the village of Cold Spring.

The cost of publication will be a charge against the municipality or corporation.

Very respectfully
DANIEL LEWIS
Commissioner of Health

ALBANY, *April* 14, 1903

Hon. EDWARD C. WEEKS, *County Clerk of Putnam County, Carmel, Putnam County, N. Y.:*

Dear Sir—Enclosed I send you a copy of the " Rules and Regulations for the Protection from Contamination of the Public

Water Supply of the Village of Cold Spring, N. Y., as approved by the State Department of Health, February 10, 1903," together with the affidavit of Irving P. McCoy, publisher of The Cold Spring Recorder, to the effect that said rules and regulations have been published in said newspaper for six weeks successively (beginning on the 20th day of February, 1903, and ending on the 27th day of March, 1903), according to law.

The rules and regulations and affidavit are now sent to you for filing in your office, in accordance with the provisions of section 70, article V, of chapter 661, laws of 1893, as amended by chapter 251, laws of 1899.

Please acknowledge receipt.

Very respectfully
DANIEL LEWIS
Commissioner of Health

HIGHLAND MILLS AND CENTRAL VALLEY WATER SUPPLY

Rules and regulations for the protection from contamination of the public water supply of the villages of Highland Mills and Central Valley, Orange Co., N. Y., enacted by the New York State Commissioner of Health under chapter 661 of the Laws of 1893 and chapter 251 of the Laws of 1899.

(Abstract of Public Health Law providing for the Protection from Contamination of Public Water Supplies. Chapter 661 of the Laws of 1893, as amended by Chapter 251 of the Laws of 1899.

Section 70. The state board of health may make rules and regulations for the protection from contamination of any or all public supplies of potable waters and their sources within the state. If any such rule or regulation relates to a temporary source or act of contamination, any person violating such rule or regulation shall be liable to prosecution for misdemeanor for every such violation, and on conviction shall be punished by a fine not exceeding two hundred dollars, or imprisonment not exceeding one year, or both. If any such rule or regulation relates to a permanent source or act of contamination, said board may impose penalties for the violation thereof or the non-compliance therewith, not exceeding two hundred dollars for every such violation or non-compliance. Every such rule or regulation shall be published at least once in each week for six consecutive weeks, in at least one newspaper of the county where the waters to which it relates are located. The cost of such publication shall be paid by the corporation or municipality benefited by the protection of the water supply, to which the rule or regulation published relates. The affidavit of the printer, publisher or proprietor of the newspaper in which such rule or regulation is published may be filed, with the rule or regulation published, in the county clerk's office of such county, and such affidavit and rule and regulation shall be conclusive evidence of such publication, and of all the facts therein stated in all courts and places.

§ 71. The officer or board having by law the management and control of the potable water supply of any municipality, of the corporation furnishing such supply, may make such inspection of the sources of such water supply, as such officer, board or corporation deems it advisable, and to ascertain whether the rules or regulations of the state board are complied with. If any such inspection discloses a violation of any such rule or regulation relating to a permanent source or act of contamination, such officer, board or corporation shall cause a copy of the rule or regulation violated to be served upon the person violating the same, with a notice of such violation. If the person served does not immediately comply with the rule or regulation violated, such officers, board or corporation shall notify the state board of the violation, which shall immediately examine into such violation; and if such person is found by the state board to have actually violated such rule or regulation, the secretary of the state board shall order the local board of health of such municipality to convene and enforce obedience to such rule or regulation. If the local board fails to enforce such order within ten days after its receipt, the corporation furnishing such water supply, or the municipality deriving its water supply from the waters to which such rule or regulation relates, may maintain an action in a court of record, which shall be tried in the county where the cause of action arose against such person, for the recovery of the penalties incurred by such violation, and for an injunction restraining him from the continued violation of such rule or regulation. All rules and regulations heretofore duly made and published for the sanitary protection of public water supplies, pursuant to chapter five hundred and forty-three of the laws of eighteen hundred and eighty-five, and chapter six hundred and sixty-one of the laws of eighteen hundred and ninety-three, as amended, are hereby legalized, ratified, confirmed and continued in force, until new rules and regulations become operative. This act shall not be construed to repeal or affect any of the provisions of chapter three hundred and seventy-eight of the laws of eighteen hundred and ninety-seven, or its amendments.

§ 72. Sewerage.—When the state board of health shall for the protection of a water supply from contamination, make orders or regulations the execution of which will require or make necessary the construction and maintenance of any system of sewerage, or a change thereof, in or for any village or hamlet, whether incorporated or unincorporated, or the execution of which will require the providing of some public means of removal or purification of sewage, the municipality or corporation owning the water-works benefited thereby shall, at its own expense, construct and maintain such system of sewerage, or change thereof, and provide such means of removal and purification of sewage and such works or means of sewage disposal as shall be approved by the state board of health. When the execution of any such regulations of the state board of health will occasion or require the removal of any building or buildings, the municipality or corporation owning the water-works benefited thereby shall, at its own expense, remove such buildings and pay to the owner thereof all damages occasioned by such removal. When the execution of any such regulation will injuriously affect any manufacturing or industrial enterprise which is not a public nuisance, such municipality or corporation shall pay all damages occasioned by the enforcement thereof. Until such construction or change of such system or systems of sewerage, and the providing of such means of removal or purification of sewage, and such works or means of sewage disposal and the removal of any building, are so made by the municipality or corporation owning the water-works to be benefited thereby at its own expense there shall be no action or proceeding taken by such municipality or corporation against any person or corporation for the violation of any regulation of the state board of health under this article, and no person or corporation shall be considered to have violated or refused to obey any such rules or regulation. The owner of any building the removal of which is occasioned or required, or which has been removed by any rule or regulation of the state board of health made under the provisions of this article, and all persons whose rights of property are injuriously affected by the enforcement of any such rule or regulation, shall have a cause of action against the municipality or corporation owning the water-works benefited by the enforcement of such rule or regulation, for all damages occasioned or sustained by such removal or enforcement, and an action therefor may be brought against such municipality or corporation in any court of record in the county in which the premises or property affected is situated and shall be tried therein; or such damages may be determined by a special proceeding in the supreme court or the county court of the county in which the property is situated. Such special proceedings shall be commenced by petition and notice to be served by such owner upon the municipality or corporation in the same manner as for the commencement of condemnation proceedings. Such municipality or corporation may make and serve an answer to such petition as in condemnation proceedings. The petition and answer shall set forth the claims of the respective parties, and the provisions of the condemnation law shall be applicable to the subsequent proceedings upon the petition and answer, if any. Either party may, before the service of the petition or answer respectively, offer to take or pay a certain sum, and no costs shall be awarded against either party unless the judgment is more unfavorable to him than his offer.

Section number 2 of chapter 29 of the Laws of 1901, which provides for the substitution of the State Department of Health for the State Board of Health, reads as follows:

§ 2. Whenever the term "state board of health" occurs or any reference is made thereto in any law, it shall be deemed to mean or refer to the "department of health" as created by this act. The commissioner of health shall have all the powers conferred and perform all the duties imposed by law upon the "state board of health," or any member, committee or officer thereof, including the secretary.

RULES AND REGULATIONS

The following rules and regulations shall apply to Cromwell Lake and to all watercourses and bodies of water on the drainage area of the same, from which Lake the water supply of the villages of Highland Mills and Central Valley, Orange Co., New York, is drawn.

The term 'watercourse' wherever used in these rules is intended to mean and comprise every spring, stream, ditch, gutter or other watercourses of any kind, the waters of which when running, whether constantly or occasionally, eventually flow, or may flow into Cromwell Lake.

PRIVIES ADJACENT TO RESERVOIRS OR WATERCOURSES

(1) No privy, privy vault, cesspool, or any other receptacle of any kind used for either temporary storage or the permanent deposit of human excreta shall be constructed, placed or maintained with its nearest point within fifty (50) feet, horizontal measurement, of the high-water mark of Cromwell lake, or of the edge, margin or precipitous bank of any watercourse of the Highland Mills and Central Valley supply.

(2) No privy, privy vault, pit, cesspool or any other receptacle used for the permanent deposit of human excreta shall be constructed, located, placed or maintained with its nearest point within two hundred (200) feet, horizontal measurement, of the water line of Cromwell lake, or within one hundred and fifty (150) feet, horizontal measurement, of the edge, margin or precipitous bank of any watercourse of the Highland Mills and Central Valley water supply.

(3) Every privy, privy vault, pit, cesspool or other receptacle or place used for the temporary storage of human excreta which is constructed, located or maintained within the aforesaid two hundred (200) feet, horizontal measurement, of the high-water mark of Cromwell lake, or within the aforesaid one hundred and fifty (150) feet, horizontal measurement, of the edge, margin or precipitous bank of any watercourse of the Highland Mills and Central Valley water supply, from which privy or other receptacle the excreta are not at once removed automatically by means of suitable water-tight pipes or conduits to some proper place of ultimate disposal, as hereinafter provided, shall be arranged in such manner that all such excreta shall be received temporarily in suitable vessels or receptacles which shall at all times be maintained in an absolutely water-tight condition, and which will permit of convenient removal to some place of ultimate disposal, as hereinafter set forth.

(4) The excreta collected in the aforesaid receptacles shall be removed and the receptacle thoroughly cleansed and deodorized

as often as may be found necessary in order to maintain the privy in proper sanitary condition and to effectually prevent any overflow upon the soil or upon the foundations or floor of the privy. In effecting this removal the utmost care shall be exercised that none of the contents be allowed to escape while being transferred from the privy to the place of disposal hereinafter specified, and that the contents while being transferred from the privy to the place of disposal shall be thoroughly covered, and that the least possible annoyance and inconvenience be caused to occupants of the premises and the adjacent premises.

(5) Unless otherwise specifically ordered or permitted by the State Commissioner of Health, the excreta collected in the aforesaid receptacles shall, when removed, be disposed of by burying in the trenches, or by thoroughly digging it into the soil in such place and manner as to effectually prevent them being washed over the surface of the ground by rain or melting snow, and at distances not less than three hundred (300) feet, horizontal measurement, from the high-water mark of Cromwell lake or not less than two hundred (200) feet from the edge, margin or precipitous bank of any watercourse of the Highland Mills and Central Valley water supply.

(6) Whenever it shall be found that owing to the character of the soil or of the surface of the ground, or owing to the height or flow of subsoil, or surface water, or other special local conditions, the excretal matter from any privy or aforesaid receptacle, or from any trench or place of disposal, may, in the opinion of the State Commissioner of Health, be washed over the surface or through the soil into Cromwell lake or any watercourse, then the said privy or receptacle for excreta, or the said trench or place of disposal shall, after due notice to the owner thereof, be removed to such greater distance or to such place as shall be considered safe and proper by the State Commissioner of Health.

SEWAGE, HOUSE SLOPS, SINK WASTE, ETC.

(7) No sewage, house slops, bath water, or excremental matter from any water-closet, privy, or cesspool shall be placed, thrown,

led, conducted, or discharged by any pipe, drain or ditch into Cromwell lake or any watercourse of the Highland Mills and Central Valley water supply, nor shall any such matter be placed, thrown, led, discharged or allowed to escape onto the surface of the ground, or into the ground below the surface, within three hundred (300) feet, horizontal measurement, from the high-water mark of Cromwell lake, or within two hundred (200) feet, horizontal measurement, of the edge, margin or precipitous bank of any watercourse of the Highland Mills and Central Valley water supply.

(8) No garbage, putrescible matter, kitchen or sink waste, refuse or waste water from creameries, cheese factories, laundries, nor water in which milk cans, utensils, clothes, bedding, carpets, or harnesses have been washed or rinsed, nor any polluted water or liquid of any kind shall be thrown or discharged directly or indirectly into Cromwell lake or any watercourse of the Highland Mills and Central Valley water supply. Nor shall any such liquid or solid refuse or waste be thrown or discharged upon the surface of the ground or into the ground below the surface within a distance of one hundred and fifty (150) feet, horizontal measurement, of Cromwell lake, or within one hundred (100) feet, horizontal measurement, of the edge, margin or precipitous bank of any watercourse of the Highland Mills and Central Valley water supply.

(9) No clothing, bedding, carpets, harness, vehicles, receptacles, utensils, nor anything that pollutes water shall be washed, rinsed or placed in Cromwell lake or any watercourse of the Highland Mills and Central Valley water supply.

BATHING, ANIMALS, MANURE, COMPOST, ETC.

(10) No person shall be allowed to bathe in Cromwell lake or any watercourse of the Highland Mills and Central Valley water supply, nor shall any animal or poultry be allowed to stand, wade or swim in said Cromwell lake or watercourse, nor to be washed therein.

(11) No stable for cattle or horses, barnyard, hog-pen, poultry house or yard, hitching place or standing place for horses or other animals, manure pile or compost heap shall be located, placed, maintained or allowed to remain with its nearest point less than one hundred and fifty (150) feet, horizontal measurement, from the highwater mark of Cromwell lake, or less than seventy-five (75) feet, horizontal measurement, from the edge, margin or precipitous bank of any watercourse of the Highland Mills and Central Valley water supply, and none of the above-named objects or sources of pollution shall be so located, placed, maintained, or allowed to remain that the drainage, leachings, or washings from the same may enter Cromwell lake or any watercourse of the Highland Mills and Central Valley water supply, without first having passed through such an extent of soil as to have been properly purified, and in no case shall it be deemed that proper purification has been secured unless the above drainage, leachings or washings shall have percolated over or through the soil in a scattered, dissipated form, and not concentrated in perceptible lines of drainage, for a distance of not less than one hundred and fifty (150) feet before entering Cromwell lake nor less than seventy-five (75) feet before entering any watercourse of the Highland Mills and Central Valley water supply.

(12) No human excrement or compost containing human excrement shall be placed, piled or spread upon the ground or dug or buried in the soil within a distance of three hundred (300) feet from the highwater line of Cromwell lake, nor within a distance of two hundred (200) feet from the edge, margin or precipitous bank of any watercourse of the Highland Mills and Central Valley water supply, and no manure or compost of any kind shall be placed, piled or spread upon the ground within one hundred and fifty (150) feet of the highwater line of Cromwell lake nor within seventy-five (75) feet of the edge, margin or precipitous bank of any watercourse of the Highland Mills and Central Valley water supply.

(13) No decayed or fermented fruit or vegetable, cider mill waste, roots, grain or other vegetable refuse of any kind shall be placed or thrown in Cromwell lake or in any watercourse of the Highland Mills and Central Valley water supply, nor shall any such material be so located, placed, maintained or allowed to remain in such places that the drainage, leachings or washings therefrom may flow by open, blind or covered drains or channels of any kind into Cromwell lake or any watercourse of the Highland Mills and Central Valley water supply without first having passed over or through such an extent of soil as to have become properly purified, and in no case shall it be deemed that sufficient purification has been secured unless the above-mentioned drainage, leachings or washings shall have percolated over or through the soil in a scattered, dissipated form, and not concentrated in perceptible lines of drainage, for a distance of not less than one hundred (100) feet before entering Cromwell lake, or a distance not less than fifty (50) feet before entering any watercourse of the Highland Mills and Central Valley water supply.

DEAD ANIMALS, OFFAL, MANUFACTURING WASTE, ETC.

(14) No dead animal, bird, fish or any part thereof, nor any offal nor any refuse from any slaughterhouse, nor any decomposable or putrescible refuse or waste matter of any kind shall be thrown, placed in or allowed to pass into Cromwell lake or any watercourse of the Highland Mills and Central Valley water supply, nor shall any such material or refuse be so located, placed, maintained or allowed to remain that the drainage, leachings or washings therefrom may reach Cromwell lake or any watercourse of the Highland Mills and Central Valley water supply without first having percolated over or through the soil in a scattered, dissipated form, and not concentrated in perceptible lines of drainage, for a distance of not less than one hundred and fifty (150) feet before entering Cromwell lake, and not less than one hundred (100) feet before entering any watercourse of the Highland Mills and Central Valley water supply.

BOATING AND FISHING

(15) Boating, fishing from boats, from rafts, from the shore, and through the ice are hereby prohibited in Cromwell lake unless expressly permitted as follows:

The board of health of the town of Woodbury, Orange county, when necessary to regulate or diminish the number of fish in Cromwell lake, or when in their opinion such privileges may be extended without endangering the purity of the waters of Cromwell lake, are hereby authorized to issue permits to riparian owners on the lake for boating or fishing, or both, under explicit written regulations and restrictions, which permits, regulations and restrictions must first be approved in writing by the State Commissioner of Health. Riparian owners to whom permits for boating or fishing shall have been issued shall be responsible for the strict compliance with all the regulations and restrictions under which such permits are issued, on the part of all persons using such permits.

A violation or non-compliance with any of the restrictions or regulations under which such permit for boating or fishing is issued shall be construed as a violation or non-compliance with this section of the rules and regulations.

LAKE LEVEL

(16) The level of the waters of Cromwell lake shall not, at any time, be drawn down for the purpose of furnishing water to any municipality, nor for any other purpose whatever, to an elevation less than two inches higher than the existing level of the surface of the water in the swamp immediately adjoining the lake at its outlet, i. e., the waters of the lake must at all times be maintained at an elevation at least two inches higher than the surface of the water in the swamp at the lake outlet at the same time.

SCREEN AT INTAKE

(17) The charcoal or broken stone screen placed about the end of the inlet pipe at the lake shall be maintained in a thoroughly

clean condition and shall be replenished as often as is necessary to keep the screening material clean and free from organic matter.

PENALTY

In accordance with section seventy of chapter six hundred sixty-one of the Laws of 1893, as amended by chapter two hundred fifty-one (251) of the Laws of 1899, the penalty for each and every violation of or non-compliance with any of the above rules and regulations which relate to a permanent source or act of contamination is hereby fixed at two hundred dollars ($200).

The foregoing rules and regulations for the protection from contamination of the public water supply of the villages of Highland Mills and Central Valley, N. Y., were duly made, ordained and established on August 8, 1903, pursuant to chapter six hundred sixty-one (661) of the laws of the State of New York for 1893, as amended by chapter two hundred fifty-one (251) of the laws of the State of New York for 1899.

T. A. STUART
Acting State Commissioner of Health

Albany, N. Y., August 8, 1903.

These rules and regulations, to be operative and valid, must first be published at least once each week for six consecutive weeks in at least one newspaper in Orange county, N. Y., and the affidavit of the printer, publisher or proprietor of the newspaper in which such publication is made, that the publication was so made, together with a copy of the rules and regulations must be filed with the county clerk.

The cost of such publication, affidavit and filing must be paid by the village authorities of Highland Mills and Central Valley, N. Y.

ALBANY, *August* 10, 1903

The Publisher of the Newburgh Journal, Newburgh, N. Y.:

Dear Sir—I send you herewith enclosed, copy of Rules and Regulations for the Protection from Contamination of the Public Water Supply of the Villages of Highland Mills and Central Valley, Orange County, N. Y., with the request that the same be published in your paper once in each week for six consecutive weeks. Send bill for same to the village authorities of Highland Mills and Central Valley, N. Y., in compliance with the following section of law:

"§ 70. Rules and regulations of state board [department] of health.—The state board [department] of health may make rules and regulations for the protection from contamination of any or all public supplies of potable waters and their sources within the state. If any such rule or regulation relates to a temporary source or act of contamination, any person violating such rule or regulation shall be liable to prosecution for misdemeanor for every such violation, and on conviction shall be punished by a fine not exceeding two hundred dollars, or imprisonment not exceeding one year, or both. If any such rule or regulation relates to a permanent source or act of contamination, said board may impose penalties for the violation thereof or the noncompliance therewith, not exceeding two hundred dollars for every such violation or non-compliance. *Every such rule or regulation shall be published at least once in each week for six consecutive weeks, in at least one newspaper of the county where the waters to which it relates are located. The cost of such publication shall be paid by the corporation or municipality benefited by the protection of the water supply, to which the rule or regulation published relates.* The affidavit of the printer, publisher or proprietor of the newspaper in which such rule or regulation is published may be filed, with the rule or regulation published, in the county clerk's office of such county, and such affidavit and rule and regulation shall be conclusive evidence of such publication, and of all the facts therein stated in all courts and places."

After the rules have been published for six consecutive weeks as required by the above section of law, you will please forward a copy of the rules as published, together with your affidavit of publication to this office, in order that the same may be filed in the office of the county clerk of your county.

Please acknowledge receipt.

Very respectfully
T. A. STUART
Acting Commissioner of Health

ALBANY, *December* 21, 1903.

HON. WILLIAM G. TAGGART, *County Clerk of Orange County, Goshen, N. Y.:*

Dear Sir—Enclosed I send you a copy of the "Rules and Regulations for the Protection from Contamination of the Public Water Supply of the Villages of Highland Mills and Central Valley, Orange County, N. Y., as approved by the State Department of Health, August 8, 1903," together with the affidavit of Sandford E. Huddelson, foreman of the "Newburgh Semi-Weekly Journal," to the effect that said rules were published in said paper, once in each week for six weeks, successively (commencing on the 14th day of August, 1903), according to law.

The rules and affidavit are now sent to you for filing in your office in accordance with the provisions of section 70, article V. of chapter 661, laws of 1893, as amended by chapter 251, laws of 1899.

Please acknowledge receipt.

Very respectfully
DANIEL LEWIS
Commissioner of Health

ITHACA

Rules for Conserving the Purity of the Water Supply of the City of Ithaca, N. Y.

The following rules and regulations apply to Six Mile Creek and Buttermilk Creek, and such of their tributaries as lie above the intakes of the public water supplies of the city of Ithaca, N. Y.

LEAST PERMISSIBLE DISTANCE OF ANY PRIVY FROM A POND OR STREAM.

(1) No privy or other place for the deposit of human excreta shall be constructed or maintained within 25 feet, horizontal measurement, of the high-water mark or precipitous bank of any spring or other source of water, or of any brook or other watercourse, the water of which, when flowing, flows eventually into the public water supply of the city of Ithaca, N. Y.

CONSTRUCTION NECESSARY IN ORDER FOR A PRIVY TO BE PERMITTED WITHIN ONE HUNDRED AND FIFTY FEET OF A POND OR STREAM

(2) Every privy or other place for the reception of human excreta, which is situated at a distance of less than 150 feet, horizontal measurement, from the high-water mark or precipitous bank of either a source of water or a watercourse, the water of which, when flowing, flows eventually into the water supply of the city of Ithaca, shall be provided with either (a) a removable water-tight receptacle for the reception of excreta, (b) a water-tight vault which can be conveniently and thoroughly cleaned, or (c) water-tight pipes which immediately remove the excreta to a place of final disposal.

PRECAUTIONS TO BE TAKEN IN REMOVING AND CLEANING RECEPTACLES

(3) The excreta collected in the removable receptacles and vaults shall be removed, and the receptacles and vaults cleansed

and disinfected, as often as may be necessary to maintain sanitary conditions and to strictly prevent any overflow upon the soil. In effecting this removal, the utmost care shall be exercised that no excreta shall be allowed to escape while being transported to the place of final disposal, and that the least possible annoyance and inconvenience be caused to the occupants of premises in the neighborhood.

FINAL DISPOSITION OF THE CONTENTS OF RECEPTACLES AND VAULTS

(4) Unless otherwise specifically ordered or permitted by the State Department of Health, the excreta collected in the aforesaid receptacles and vaults shall, when removed, be disposed of by burying in trenches, or by thoroughly digging into the soil at such places and in such manner as to effectually prevent them, or any portion of them, from being washed over the surface of the ground by rain, melting snow or other causes. The excreta are to be buried beneath not less than two feet of earth, or dug into the soil, at a distance of not less than 500 feet, horizontal measurement, from the high-water mark or precipitous bank of any spring, marsh or other source of water, or of any watercourse, the water of which, when running, flows eventually into the public water supply of the city of Ithaca, N. Y.

(5) Whenever it shall be found that owing to the character of the soil or of the surface of the ground, or to the character of the subsoil or height or flow of surface water or ground water or other special local conditions, excrement matter may, in the opinion of the State Department of Health, be washed over the surface of the ground or through the soil, into any pond, reservoir, spring, well, stream, ditch, gutter or any other watercourse which, when running, flows into the public water supply of the city of Ithaca, then the place of disposal shall, after due notice to the owner thereof, be removed to such greater distance or such place as shall be considered safe by the State Department of Health.

CARE OF SEWAGE, HOUSE SLOP, GARBAGE, ETC.

(6) No sewage, garbage, ashes, putrescible matter, house slop, sink waste, water in which milk cans, clothing or bedding have been washed or rinsed, nor any polluted water or liquid, shall be thrown or discharged into any pond, reservoir, spring, stream, well, ditch, gutter or other watercourse tributary to the water supply of the city of Ithaca, nor shall any such liquid or solid matter be thrown or discharged upon the surface of the ground, or into the ground below the surface, in any manner whereby the same may flow into any aforesaid tributary within 50 feet, horizontal measurement, of the high-water mark or precipitous bank of any spring, marsh or other source of water, or of any watercourse, the water of which, when running, flows eventually into the public water supply of the city of Ithaca, N. Y.

WASHING AND BATHING IN THE SUPPLY PROHIBITED

(7) No clothing, animals, vehicles, nor anything which pollutes water shall be washed in, nor shall any person bathe in any pond, reservoir or watercourse forming or contributing to the water supply of the city of Ithaca.

CONTROL OF DRAINAGE FROM PILES OF MANURE AND VEGETABLE MATTER

(8) No piles of manure or of fermenting or decayed fruit, vegetables, roots, grains, nor any piles of sawdust, leaves or other vegetable matter, shall be located or allowed to remain in such place or manner that the washing or drainage thereof may flow by open or covered channels into any tributary of the water supply of Ithaca, unless after having first passed over or through such amount of soil as to have become properly purified; and in no case shall the distance from the aforesaid piles to the high-water mark or precipitous bank of any spring, marsh or other source of water, or of any watercourse, the water of which, when running, flows eventually into the public water supply of the city of Ithaca, N. Y., be less than 50 feet, horizontal measurement.

RESTRICTIONS APPLYING TO MANURE AND COMPOST UPON LAND

(9) No human excreta nor compost containing human excreta shall be spread upon the ground within 150 feet, horizontal measurement, of the high-water mark or precipitous bank of any spring, marsh or other source of water, or of any watercourse, the water of which, when running flows eventually into the public water supply of the city of Ithaca, and no manure nor compost of any kind shall be spread or deposited so as to be washed a less distance than 50 feet over the surface of the ground before reaching the nearest point of the aforesaid watercourse.

PREVENTION OF POLLUTION BY DEAD ANIMALS, FARM YARDS AND MANUFACTURING ESTABLISHMENTS

(10) No dead animal, bird or fish, nor any part thereof, nor any putrescible matter nor polluted water from any slaughterhouse, farm yard, dairy, creamery, cider mill or other manufactory, shall be thrown or be allowed to run into any pond, reservoir, spring, well, stream, ditch, gutter or other watercourse tributary to the water supply of the city of Ithaca; nor shall any such matter be so deposited that any portion thereof, or of the polluted drainage therefrom, shall be washed over the surface of the ground or through the soil a less distance than 75 feet before reaching the nearest point of a tributary of the aforesaid water supply.

PENALTY

(11) In accordance with section 70 of chapter 661 of the Laws of 1893 as amended by chapter 251 of the Laws of 1899, a penalty of $200 is hereby imposed against any person, firm or corporation who shall be adjudged guilty of, or a non-compliance with, any of the above mandatory rules and regulations, the same to be recovered under the above said law.

The foregoing rules and regulations for the protection from contamination of the public water supply of the city of Ithaca,

N. Y., were duly made, ordained and established on April 21, 1903, pursuant to chapter six hundred sixty-one (661) of the Laws of the State of New York for 1893, as amended by chapter two hundred fifty-one (251) of the Laws of the State of New York for 1899.

DANIEL LEWIS
State Commissioner of Health

Albany, N. Y., April 21, 1903.

These rules and regulations, to be operative and valid, must first be published at least once each week for six consecutive weeks in at least one newspaper in Tompkins county, N. Y., and the affidavit of the printer, publisher, or proprietor of the newspaper in which such publication is made, that the publication was so made, together with a copy of the rules and regulations must be filed with the County Clerk.

The cost of such publication, affidavit, and filling must be paid by the authorities of the city of Ithaca, N. Y.

ALBANY, *April* 25, 1903

The Publishers of the "Ithaca Daily News," Ithaca, N. Y.:

Gentlemen—I send you herewith enclosed copy of "Rules for conserving the purity of the water supply of the city of Ithaca, N. Y.," with the request that the same be published in your paper once in each week for six consecutive weeks. Send bill for same to the authorities of the city of Ithaca, N. Y., in compliance with the following section of law:

"§ 70. Rules and regulations of state board [department] of health.—The state board [department] of health may make rules and regulations for the protection from contamination of any or all public supplies of potable waters and their sources within the state. If any such rule or regulation relates to a temporary source or act of contamination, any person violating such rule or regulation shall be liable to prosecution for misdemeanor for every such violation, and on conviction shall be punished by a fine not exceeding two hundred dollars, or imprisonment not exceeding one year, or both. If any such rule or regulation relates to a permanent source or act of contamination, said board may impose penalties for the violation thereof or the non-compliance therewith, not exceeding two hundred dollars for every such violation or non-compliance. *Every such rule or regulation shall be published at least once in each week for six consecutive weeks, in at least one newspaper of the county where the waters to which it relates are located. The cost of such publication shall be paid by the corporation or municipality benefited by the protection of the water supply to which the rule or regulation published relates.* The affidavit of the printer, publisher or proprietor of the newspaper in which such rule or regulation is published may be filed, with the rule or regulation published, in the county clerk's office of such county, and such affidavit and rule and regulation shall be conclusive evidence of such publication, and of all the facts therein stated in all courts and places."

After the rules have been published for six consecutive weeks as required by the above section of law, you will please forward a copy of the rules as published, together with your affidavit of publication, to this office, in order that the same may be filed in the office of the county clerk of your county.

Please acknowledge receipt.

Very respectfully
DANIEL LEWIS
Commissioner of health

ALBANY, *April* 25, 1903

The Publishers of the "Ithaca Journal," Ithaca, N. Y.:

Gentlemen—I send you herewith enclosed copy of "Rules for conserving the purity of the water supply of the city of Ithaca, N. Y.," with the request that the same be published in your paper once in each week for six consecutive weeks. Send bill for same to the authorities of the city of Ithaca, N. Y., in compliance with the following section of law:

"§ 70. Rules and regulations of State Board [Department] of Health.—The State Board [Department] of Health may make rules and regulations for the protection from contamination of any or all public supplies of potable waters and their sources within the state. If any such rule or regulation relates to a temporary source or act of contamination, any person violating such rule or regulation shall be liable to prosecution for misdemeanor for every such violation, and on conviction shall be punished by a fine not exceeding two hundred dollars, or imprisonment not exceeding one year, or both. If any such rule or regulation relates to a permanent source or act of contamination, said board may impose penalties for the violation thereof or the non-compliance therewith, not exceeding two hundred dollars for every such violation or non-compliance. *Every such rule or regulation shall be published at least once in each week for six consecutive weeks, in at least one newspaper of the county where the waters to which it relates are located. The cost of such publication shall be paid by the corporation or municipality benefited by the protection of the water supply to which the rule or regulation published relates.* The affidavit of the printer, publisher or proprietor of the newspaper in which such rule or regulation is published may be filed, with the rule or regulation published, in the county clerk's office of such county, and such affidavit and rule and regulation shall be conclusive evidence of such publication, and of all the facts therein stated in all courts and places."

After the rules have been published for six consecutive weeks as required by the above section of law, you will please forward a copy of the rules as published, together with your affidavit of publication, to this office, in order that the same may be filed in the office of the county clerk of your county.

Please acknowledge receipt.

Very respectfully
DANIEL LEWIS
Commissioner of health

ALBANY, *July* 23, 1903

Mr. LEROY H. VAN KIRK, *County Clerk of Tompkins County, Ithaca, N. Y.:*

Dear Sir—Enclosed I send you a copy of the "Rules for conserving the purity of the water supply of the city of Ithaca, N. Y., as approved by the State Department of Health, April 21, 1903," together with the affidavit of M. M. Dayton, one of the publishers of the "Ithaca Daily News," to the effect that said rules have been published in said newspaper once in each week for six successive weeks (and that the first publication of said notice was on the 29th day of April, 1903); also affidavit of Clarence A. Snyder, bookkeeper and head clerk of "The Ithaca Journal," to the effect that said rules have been published in said newspaper once in each week for six successive weeks (and that the first publication of said notice was on the 27th day of April, 1903), according to law.

The rules and affidavits are now sent to you for filing in your office in accordance with the provisions of section 70, article V, of chapter 661, laws of 1893, as amended by chapter 251, laws of 1899.

Please acknowledge receipt.

Very respectfully
T. A. STUART
Acting commissioner of health

MIDDLETOWN

Rules and regulations for the protection from contamination of the public water supply of the city of Middletown, N. Y., enacted by the New York State Commissioner of Health under chapter 661 of the laws of 1893 and chapter 251 of the laws of 1899

[Abstract of the public health law providing for the protection from contamination of public water supplies. Chapter 661 of the laws of 1893, as amended by chapter 251 of the laws of 1899.]

§ 70. The State Board of Health may make rules and regulations for the protection from contamination of any or all public supplies of potable waters and their sources within the state. If any such rule or regulation relates to a temporary source or act of contamination, any person violating such rule or regulation shall be liable to prosecution for misdemeanor for every such violation, and on conviction shall be punished by a fine not exceeding two hundred dollars, or imprisonment not exceeding one year, or both. If any such rule or regulation relates to a permanent source or act of contamination, said board may impose penalties for the violation thereof or the non-compliance therewith, not exceeding two hundred dollars for every such violation or non-compliance. Every such rule or regulation shall be published at least once in each week for six consecutive weeks, in at least one newspaper of the county where the waters to which it relates are located. The cost of such publication shall be paid by the corporation or municipality benefited by the protection of the water supply, to which the rule or regulation published relates. The affidavit of the printer, publisher or proprietor of the newspaper in which such rule or regulation is published may be filed, with the rule or regulation published, in the county clerk's office of such county, and such affidavit and rule and regulation shall be conclusive evidence of such publication, and of all the facts therein stated in all courts and places.

§ 71. The officer or board having by law the management and control of the potable water supply of any municipality, or the corporation furnishing such supply, may make such inspection of the sources of such water supply, as such officer, board or corporation deems it advisable, and to ascertain whether the rules or regulations of the state board are complied with. If any such inspection discloses a violation of any such rule or regulation relating to a permanent source or act of contamination, such officer, board or corporation shall cause a copy of the rule or regulation violated to be served upon the person violating the same, with a notice of such violation. If the person served does not immediately comply with the rule or regulation violated, such officer, board or corporation shall notify the state board of the violation, which shall immediately examine into such violation; and if such person is found by the state board to have actually violated such rule or regulation, the secretary of the state board shall order the local board of health of such municipality to convene and enforce obedience to such rule or regulation. If the local board fails to enforce such order within ten days after its receipt, the corporation furnishing such water supply, or the municipality deriving its water supply from the waters to which such rule or regulation relates, may maintain an action in a court of record, which shall be tried in the county where the cause of action arose against such person, for the recovery of the penalties incurred by such violation, and for an injunction restraining him from the continued violation of such rule or regulation. All rules and regulations heretofore duly made and published for the sanitary protection of public water supplies, pursuant to chapter five hundred and forty-three of the laws of eighteen hundred and eighty-five, and chapter six hundred and sixty-one of the laws of eighteen hundred and ninety-three, as amended, are hereby legalized, ratified, confirmed and continued in force, until new rules and regulations become operative. This act shall not be construed to repeal or affect any of the provisions of chapter three hundred and seventy-eight of the laws of eighteen hundred and ninety-seven, or its amendments.

§ 72. Sewerage.—When the State Board of Health shall, for the protection of a water supply from contamination, make orders or regulations the execution of which will require or make necessary the construction and maintenance of any system of sewerage, or a change thereof, in or for any village or hamlet, whether incorporated or unincorporated, or the execution of which will require the providing of some public means of removal or purification of sewage, the municipality or corporation owning the water-works benefited thereby shall, at its own expense, construct and maintain such system of sewerage, or change thereof, and provide such means of removal and purification of sewage and such works or means of sewage disposal as shall be approved by the State Board of Health. When the execution of any such regulations of the State Board of Health will occasion or require the removal of any building or buildings, the municipality or corporation owning the water-works benefited thereby shall, at its own expense, remove such buildings and pay to the owner thereof all damages occasioned by such removal. When the execution of any such regulation will injuriously affect any manufacturing or industrial enterprise which is not a public nuisance, such municipality or corporation shall pay all damages occasioned by the enforcement thereof. Until such construction or change of such system or systems of sewerage, and the providing of such means of removal or purification of sewage, and such works or means of sewage disposal and the removal of any building, are so made by the municipality or corporation owning the water-works to be benefited thereby at his own expense, there shall be no action or proceeding taken by such municipality or corporation against any person or corporation for the violation of any regulation of the State Board of Health under this article, and no person or corporation shall be considered to have violated or refused to obey any such rule or regulation. The owner of any building the removal of which is occasioned or required, or which has been removed by any rule or regulation of the State Board of Health made under the provisions of this article, and all persons whose rights of property are injuriously affected by the enforcement of any such rule or regulation, shall have a cause of action against the municipality or corporation owning the water-works benefited by the enforcement of any such rule or regulation, for all damages occasioned or sustained by such removal or enforcement, and an action therefor may be brought against such municipality or corporation in any court of record in the county in which the premises or property affected is situated and shall be tried therein; or such damages may be determined by a special proceeding in the supreme court or the county court of the county in which the property is situated. Such proceedings shall be commenced by petition and notice to be served by such owner upon the municipality or corporation in the same manner as for the commencement of condemnation proceedings. Such municipality or corporation may make and serve an answer to such petition as in condemnation proceedings. The petition and answer shall set forth the claims of the respective parties, and the provisions of the condemnation law shall be applicable to the subsequent proceedings upon the petition and answer, if any. Either party may, before the service of the petition or answer respectively, offer to take or pay a certain sum, and no costs shall be awarded against either party unless the judgment is more unfavorable to him than his offer.

Section number 2 of chapter number 29 of the Laws of 1901, which provides for the substitution of the State Department of Health for the State Board of Health, reads as follows:

§ 2. Whenever the term " State Board of Health " occurs or any reference is made thereto in any law, it shall be deemed to mean or refer to the " Department of Health " as created by this act. The Commissioner of Health shall have all the powers conferred and perform all the duties imposed by law upon the State Board of Health, or any member, committee or officer thereof, including the secretary.

RULES AND REGULATIONS

The following rules and regulations shall apply to all streams, lakes and reservoirs on the drainage areas tributary to the reservoirs from which water is drawn for the water supply of the city of Middletown, Orange county, New York, which are intended to comprise all watercourses entering or ultimately discharging into the Monhagen reservoir, the Highland reservoir and the Shawangunk reservoir.

The term " reservoir " whenever used in these rules is intended to mean and comprise each of the above three named " reservoirs." The term " watercourse " wherever used in these rules is intended to mean and comprise every spring, stream, ditch, gutter or other watercourses of any kind, the waters of which when running, whether constantly or occasionally, eventually flow, or may flow, into either of the above named " reservoirs."

PRIVIES ADJACENT TO RESERVOIRS OR WATERCOURSES

(1) No privy, privy vault, pit, cesspool, or any other receptacle of any kind used for either temporary storage or the permanent deposit of human excreta shall be constructed, placed or maintained with its nearest point within fifty (50) feet, horizontal measurement, of the high water mark of any reservoir, or of the edge, margin or precipitous bank of any watercourse of the Middletown supply.

(2) No privy, privy vault, pit, cesspool or any other receptacle used for the permanent deposit of human excreta shall be constructed, located, placed or maintained with its nearest point within two hundred (200) feet, horizontal measurement, of the water line of any reservoir of the Middletown water supply, or within one hundred fifty (150) feet, horizontal measurement, of the edge, margin or precipitous bank of any watercourse of the Middletown water supply.

(3) Every privy, privy vault, pit, cesspool or other receptacle or place used for the temporary storage of human excreta which is constructed, located or maintained within the aforesaid two hundred (200) feet, horizontal measurement, of the high water mark of any reservoir, or within the aforesaid one hundred fifty (150) feet, horizontal measurement, of the edge, margin or precipitous bank of any watercourse of the Middletown water supply, from which privy or other receptacle the excreta are not at once removed automatically by means of suitable water-tight pipes or conduits to some proper place of ultimate disposal, as hereinafter provided, shall be arranged in such manner that all such excreta shall be received temporarily in suitable vessels or receptacles which shall at all times be maintained in an absolutely water-tight condition and which will permit of convenient removal to some place of ultimate disposal as hereinafter set forth.

(4) The excreta collected in the aforesaid receptacles shall be removed and the receptacles thoroughly cleansed and deoderized as often as may be found necessary in order to maintain the privy

in proper sanitary condition and to effectually prevent any overflow upon the soil or upon the foundations or floor of the privy. In effecting this removal the utmost care shall be exercised that none of the contents be allowed to escape while being transferred from the privy to the place of disposal hereinafter specified, and that the contents, while being transferred from the privy to the place of disposal, shall be thoroughly covered and that the least possible annoyance and inconvenience be caused to occupants of the premises and the adjacent premises.

(5) Unless otherwise specifically ordered or permitted by the State Commissioner of Health the excreta collected in the aforesaid receptacles shall, when removed, be disposed of by burying in trenches, or by thoroughly digging it into the soil in such place and manner as to effectually prevent them being washed over the surface of the ground by rain or melting snow, and at distances not less than three hundred (300) feet, horizontal measurement, from the high-water mark of any reservoir or not less than two hundred (200) feet from the edge, margin, or precipitous bank of any watercourse of the Middletown water supply.

(6) Whenever it shall be found that owing to the character of the soil or of the surface of the ground, or owing to the height or flow of sub-soil, or surface water, or other special local conditions, the excretal matter, from any privy or aforesaid receptacle, or from any trench or place of disposal may, in the opinion of the State Commissioner of Health, be washed over the surface or through the soil into any reservoir or watercourse, then the said privy or receptacle for excreta or the said trench or place of disposal shall, after due notice to the owner thereof, be removed to such greater distance or to such place as shall be considered safe and proper by the State Commissioner of Health.

SEWAGE, HOUSE SLOPS, SINK WASTE, ETC.

(7) No sewage, house slops, bath water, or excremental matter from any water-closet, privy, or cesspool shall be led, conducted, or discharged by any pipe, drain or ditch into any reservoir or

watercourse of the Middletown water supply nor shall any such matter be placed, led, discharged or allowed to escape onto the surface of the ground or into the ground below the surface within three hundred (300) feet, horizontal measurement, from the high-water mark of any reservoir, or within two hundred (200) feet, horizontal measurement, of the edge, margin or precipitous bank of any watercourse of the Middletown water supply.

(8) No garbage, putrescible matter, kitchen or sink waste, refuse or waste water from creameries, cheese factories, laundries, nor water in which milk cans, utensils, clothes, bedding, carpets, or harnesses have been washed or rinsed, nor any polluted water or liquid of any kind shall be thrown or discharged directly or indirectly into any reservoir or watercourse of the Middletown water supply. Nor shall any such liquid or solid refuse or waste be thrown or discharged upon the surface of the ground or into the ground below the surface within a distance of two hundred (200) feet, horizontal measurement, of any reservoir or within one hundred and fifty (150) feet, horizontal measurement, of the edge, margin or precipitous bank of any watercourse of the Middletown water supply.

(9) No clothing, bedding, carpets, harness, vehicles, receptacles, utensils, nor anything that pollutes water shall be washed, rinsed or placed in any reservoir or watercourse of the Middletown water supply.

BATHING, ANIMALS, MANURE, COMPOST, ETC.

(10) No person shall be allowed to bathe in any reservoir or watercourse of the Middletown water supply, nor shall any animal or poultry be allowed to stand, wade or swim in said reservoir or watercourse, nor to be washed therein.

(11) No stable for cattle or horses, barnyard, hog-pen, poultry house or yard, hitching place or standing place for horses or other animals, manure pile or compost heap shall be located, placed, maintained or allowed to remain with its nearest point less than one hundred fifty (150) feet, horizontal measurement, from the high-water mark of any reservoir, or less than seventy-

five (75) feet, horizontal measurement, from the edge, margin or precipitous bank of any watercourse of the Middletown water supply, and none of the above-named objects or sources of pollution shall be so located, placed, maintained, or allowed to remain that the drainage, leachings, or washings from the same may enter any reservoir or watercourse of the Middletown water supply, without first having passed through such an extent of soil as to have been properly purified, and in no case shall it be deemed that proper purification has been secured unless the above drainage, leachings or washings shall have percolated over or through the soil in a scattered, dissipated form, and not concentrated in perceptible lines of drainage, for a distance of not less than one hundred and fifty (150) feet before entering any reservoir nor less than seventy-five (75) feet before entering any watercourse of the Middletown water supply.

(12) No human excrement or compost containing human excrement shall be placed, piled or spread upon the ground, or dug or buried in the soil within a distance of three hundred (300) feet from the high-water line of any reservoir, nor within a distance of two hundred (200) feet from the edge, margin or precipitous bank of any watercourse of the Middletown water supply and no manure or compost of any kind shall be placed, piled or spread upon the ground within one hundred fifty (150) feet of the high-water line of any reservoir nor within seventy-five feet of the edge, margin or precipitous bank of any watercourse of the Middletown water supply.

(13) No decayed or fermented fruit or vegetable, cider mill waste, roots, grain or other vegetable refuse of any kind shall be located, placed, maintained or allowed to remain in such places that the drainage, leachings, or washings therefrom may flow by open, blind or covered drains or channels of any kind into any reservoir or watercourse of the Middletown water supply without first having passed over or through such an extent of soil as to have become properly purified, and in no case shall it be deemed that sufficient purification has been secured unless the above mentioned drainage, leachings or wash-

ings shall have percolated over or through the soil in a scattered, dissipated form, and not concentrated in perceptible lines of drainage, for a distance of not less than one hundred (100) feet before entering any reservoir, or a distance not less than fifty (50) feet before entering any watercourse of the Middletown water supply.

DEAD ANIMALS, OFFAL, MANUFACTURING WASTE, ETC.

(14) No dead animal, bird, fish or any part thereof, nor any offal nor any refuse from any slaughter-house, nor any decomposable or putrescible refuse or waste matter of any kind shall be thrown, placed in, or allowed to pass into any reservoir or watercourse of the Middletown water supply, nor shall any such material or refuse be so located, placed, maintained, or allowed to remain that the drainage, leachings, or washings therefrom may reach any reservoir or watercourse of the Middletown water supply without first having percolated over or through the soil in a scattered, dissipated form, and not concentrated in perceptible lines of drainage, for a distance of not less than one hundred and fifty (150) feet before entering any reservoir, and not less than one hundred (100) feet before entering any watercourse of the Middletown water supply.

BOATING AND FISHING

(15) Boating, fishing from boats, from rafts, from the shore. and through the ice are hereby prohibited in any and all of the reservoirs of the Middletown water supply.

The board of water commissioners of Middletown, when necessary to regulate or diminish the number of fish in any of the reservoirs, or when in their opinion such privileges may be extended without endangering the purity of the water supply, are hereby authorized to permit boating or fishing or both under explicit regulations and restrictions. Such permit, regulations and restrictions must first be approved in writing by the State Commissioner of Health.

A violation or non-compliance with any of the restrictions or regulations under which such permit for boating or fishing is issued shall be construed as a violation or non-compliance with this section of the rules and regulations.

PENALTY

(15) In accordance with section seventy of chapter six hundred sixty-one (661) of the laws of 1893, as amended by chapter two hundred fifty-one (251) of the laws of 1899, the penalty for each and every violation of, or non-compliance with, any of the above rules and regulations which relate to a permanent source or act of contamination is hereby fixed at two hundred dollars ($200).

The foregoing rules and regulations for the protection from contamination of the public water supply of the city of Middletown, N. Y., were duly made, ordained and established on May 30, 1903, pursuant to chapter six hundred sixty-one (661) of the laws of the State of New York for 1893, as amended by chapter two hundred fifty-one (251) of the laws of the State of New York for 1899.

DANIEL LEWIS
Sate commissioner of health

Albany, N. Y., May 30, 1903

These rules and regulations, to be operative and valid, must first be published at least once each week for six consecutive weeks in at least one newspaper in Orange county, N. Y., and the affidavit of the printer, publisher, or proprietor of the newspaper in which such publication is made that the publication was so made, together with a copy of the rules and regulations, must be filed with the county clerk.

The cost of such publication, affidavit, and filing must be paid by the city authorities of Middletown, N. Y.

ALBANY, *June* 2, 1903

The Publishers of the "Middletown Daily Times," Middletown, N. Y.:

Gentlemen—I send you herewith enclosed copy of "Rules and regulations for the protection from contamination of the public water supply of the city of Middletown, N. Y." with the request that the same be published in your paper once in each week for six consecutive weeks. Send bill for same to the board of water commissioners, Middletown, N. Y., in compliance with the following section of law:

"§ 70. Rules and regulations of State Board [Department] of Health.—The State Board [Department] of Health may make rules and regulations for the protection from contamination of any or all public supplies of potable waters and their sources within the state. If any such rule or regulation relates to a temporary source or act of contamination, any person violating such rule or regulation shall be liable to prosecution for misdemeanor for every such violation, and on conviction shall be punished by a fine not exceeding two hundred dollars, or imprisonment not exceeding one year, or both. If any such rule or regulation relates to a permanent source or act of contamination, said board may impose penalties for the violation thereof or the non-compliance therewith, not exceeding two hundred dollars for every such violation or non-compliance. *Every such rule or regulation shall be published at least once in each week for six consecutive weeks, in at least one newspaper of the county where the waters to which it relates are located. The cost of such publication shall be paid by the corporation or municipality benefited by the protection of the water supply, to which the rule or regulation published relates.* The affidavit of the printer, publisher or proprietor of the newspaper in which such rule or regulation is published may be filed, with the rule or regulation published, in the county clerk's office of such county, and such affidavit and rule and regulation shall be conclusive evidence of such publication, and of all the facts therein stated in all courts and places."

After the rules have been published for six consecutive weeks as required by the above section of law, you will please forward a copy of the rules as published, together with your affidavit of publication, to this office, in order that the same may be filed in the office of the county clerk of your county.

Please acknowledge receipt.

Very respectfully
DANIEL LEWIS
Commissioner of health

ALBANY, *June* 2, 1903

The Publishers of the "Middletown Daily Press," Middletown, N. Y.:

Gentlemen—I send you herewith enclosed copy of "Rules and regulations for the protection from contamination of the public water supply of the city of Middletown, N. Y." with the request that the same be published in your paper once in each week for six consecutive weeks. Send bill for same to the board of water commissioners, Middletown, N. Y., in compliance with the following section of law:

"§ 70. Rules and regulations of State Board [Department] of Health.—The State Board [Department] of Health may make rules and regulations for the protection from contamination of any or all public supplies of potable waters and their sources within the state. If any such rule or regulation relates to a temporary source or act of contamination, any person violating such rule or regulation shall be liable to prosecution for misdemeanor for every such violation, and on conviction shall be punished by a fine not exceeding two hundred dollars, or imprisonment not exceeding one year, or both. If any such rule or regulation relates to a permanent source or act of contamination, said board may impose penalties for the violation thereof or the non-compliance therewith, not exceeding two hundred dollars for every such violation or non-compliance. *Every such rule or regulation* *shall be published at least once in each week for six consecutive weeks, in at least one newspaper of the county where the waters to which it relates are located. The cost of such publication shall be paid by the corporation or municipality benefited by the protection of the water supply, to which the rule or regulation published relates.* The affidavit of the printer, publisher or proprietor of the newspaper in which such rule or regulation is published may be filed, with the rule or regulation published, in the county clerk's office of such county, and such affidavit and rule and regulation shall be conclusive evidence of such publication, and of all the facts therein stated in all courts and places."

After the rules have been published for six consecutive weeks as required by the above section of law, you will please forward a copy of the rules as published, together with your affidavit of publication, to this office, in order that the same may be filed in the office of the county clerk of your county.

Please acknowledge receipt.

Very respectfully
DANIEL LEWIS
Commissioner of health

Albany, *June* 2, 1903

The Publishers of the "Middletown Daily Argus," Middletown, N. Y.:

Gentlemen—I send you herewith enclosed copy of "Rules and regulations for the protection from contamination of the public water supply of the city of Middletown, N. Y." with the request that the same be published in your paper once in each week for six consecutive weeks. Send bill for same to the board of water commissioners, Middletown, N. Y., in compliance with the following section of law:

"§ 70. Rules and regulations of State Board [Department] of Health.—The State Board [Department] of Health may make rules and regulations for the protection from contamination of any or all public supplies of potable waters and their sources within the state. If any such rule or regulation relates to a temporary source or act of contamination, any person violating such rule or regulation shall be liable to prosecution for misdemeanor for every such violation, and on conviction shall be punished by a fine not exceeding two hundred dollars, or imprisonment not exceeding one year, or both. If any such rule or regulation relates to a permanent source or act of contamination, said board may impose penalties for the violation thereof or the non-compliance therewith, not exceeding two hundred dollars for every such violation or non-compliance. *Every such rule or regulation shall be published at least once in each week for six consecutive weeks, in at least one newspaper of the county where the waters to which it relates are located. The cost of such publication shall be paid by the corporation or municipality benefited by the protection of the water supply, to which the rule or regulation published relates.* The affidavit of the printer, publisher or proprietor of the newspaper in which such rule or regulation is published may be filed, with the rule or regulation published, in the county clerk's office of such county, and such affidavit and rule and regulation shall be conclusive evidence of such publication, and of all the facts therein stated in all courts and places."

After the rules have been published for six consecutive weeks as required by the above section of law, you will please forward a copy of the rules as published, together with your affidavit of publication, to this office, in order that the same may be filed in the office of the county clerk of your county.

Please acknowledge receipt.

Very respectfully

DANIEL LEWIS

Commissioner of health

ALBANY, *July* 24, 1903

HON. WILLIAM G. TAGGART, *County Clerk of Orange County, Goshen, N. Y.:*

Dear Sir—Enclosed I send you a copy of the "Rules and regulations for the protection from contamination of the public water supply of the city of Middletown, N. Y., as approved by the State Department of Health, May 30, 1903," together with the affidavit of L. S. Stivers, one of the publishers of the "Middletown Daily Times," to the effect that said rules were published once a week in said newspaper for six weeks consecutively (commencing on the 6th day of June, 1903); also affidavit of C. Macardell, Jr., publisher of the "Middletown Argus," to the effect that the rules were published once a week in said newspaper for six weeks consecutively (commencing on the 6th day of June, 1903); and the affidavit of John W. Slauson, one of the publishers of the "Middletown Daily Press," to the effect that said rules were published once a week in said newspaper for seven weeks consecutively (commencing on the 6th day of June, 1903), according to law.

The rules and affidavits are now sent to you for filing in your office in accordance with the provisions of section 70, article V, of chapter 661, Laws of 1893, as amended by chapter 251, Laws of 1899.

Please acknowledge receipt.

Very respectfully
T. A. STUART
Acting commissioner of health

SPRING VALLEY WATER AND SUPPLY COMPANY AND HACKENSACK WATER COMPANY

NEW YORK, *June* 19, 1903

Hon. DANIEL LEWIS, *State Commissioner of Health, 252 Madison Avenue, New York:*

Sir—The Spring Valley Water and Supply Company and the Hackensack Water Company, the former a New York corporation and the latter a New Jersey corporation, hereby respectfully request that in pursuance of section 70, chapter 661, of the Laws of 1893, and the laws amendatory or supplemental thereto, you formulate rules and regulations for protection from contamination of the water supply furnished by these companies from the waters of the Hackensack and Pascack rivers and their tributaries.

Yours respectfully
SPRING VALLEY WATER AND SUPPLY CO.
By ROBERT W. DE FOREST, *President*
HACKENSACK WATER CO.
By ROBERT W. DE FOREST, *President*

Hon. DANIEL LEWIS, M. D., *State Commissioner of Health, Albany, N. Y.:*

Sir—In compliance with your instructions I have examined the "Rules for the protection of the purity of the water of the Hackensack and Pascack rivers and their tributaries within the State of New York," submitted by the president of the Spring Valley Water and Supply Company and the Hackensack Water Company. I have also made an inspection of the water shed of the Pascack river adjacent to the line of the stream, between the New Jersey state line and the village of Spring Valley.

The draft of rules appears to be well considered and to be entirely satisfactory for accomplishing the desired object.

Between the state line and Spring Valley no nuisances were observed.

In the village of Spring Valley, however, the conditions are not satisfactory. For several hundred feet the main street of the village runs parallel to Pascack creek and some six hundred feet distant from it.

The east side of the street is occupied by residences built up closely, on ground sloping rapidly towards the swamp about five hundred feet wide which borders the creek and is overflowed in freshets. On the rear line of these properties, about 100 feet from the street, there is a retaining wall some four or five feet high and on the top of this wall and overhanging the swamp land is a row of privies. All the foecal deposits and house waste from this row of houses are dumped on the surface of the ground at the base of this wall and are carried away by the water of the stream when it overflows the swamp.

There has been a water supply recently introduced in the village, but no provision has yet been made for disposing of the increased quantity of wastes consequent upon the free use of water for domestic purposes.

Until a system of sewers is constructed with proper provision for disposal of the sewage in such a manner that it will not enter the stream unpurified, the village of Spring Valley, and especially that portion of it which lies along Main street, north of Church street, can not but be considered as a serious menace to the purity of the Pascack creek and the health of communities which derive their water supply from the creek below that point.

The accompanying map shows the location of the nuisances which are most objectionable at the present time.

Respectfully submitted.

J. J. R. CROES
Consulting Engineer

Rules and regulations of the State Department of Health, State of New York, for the Hackensack and Pascack rivers and their tributaries within the state of New York

The following rules and regulations apply to all those portions of the Hackensack and Pascack rivers which are situated within the state of New York lying above the intake of the Hackensack Water Company, as well as to every spring, stream, ditch, gutter, drain or watercourse of any kind, the waters of which when running flow eventually into the Hackensack or Pascack rivers within the said state above such intake.

PRIVIES ADJACENT TO PONDS, LAKES, RESERVOIRS OR WATERCOURSES

(1) No privy, privy vault, pit or cesspool or any other receptacle of any kind used for the deposit, reception or storage of human excreta shall be constructed, located, placed or maintained with

its nearest point within fifty (50) feet horizontal measurement, of the high-water mark of any lake, pond or reservoir or of the edge, margin or precipitous bank of any spring, stream, ditch, gutter, drain or other watercourse of any kind the waters of which comprise or when running flow eventually into the Hackensack or Pascack rivers within the said state.

(2) Every privy, privy vault, pit or cesspool or other receptacle or place used for the deposit, reception of storage of human excreta which is constructed, located or maintained within two hundred and fifty (250) feet, horizontal measurement, of the high-water mark of any lake, pond or reservoir or of the edge, margin or precipitous bank of any spring, stream, ditch, gutter, drain or watercourse of any kind whose waters comprise or when running flow into the Hackensack or Pascack rivers within the said state, and from which privy or other receptacle the excreta are not at once removed automatically by means of suitable water-tight pipes or conduits to some proper place of ultimate disposal as hereinafter provided, shall be arranged in such manner that all such excreta shall be received temporarily in suitable vessels or receptacles which shall at all times be maintained in an absolutely water-tight condition, and which will permit of convenient removal to some place of ultimate disposal as hereinafter set forth.

(3) The excreta collected in the aforesaid removable receptacles shall be removed and the receptacles cleansed and deodorized as often as may be found necessary in order to maintain the privy in proper sanitary condition and to effectually and strictly prevent any overflow upon the soil or upon the foundations or floor of the privy. In effecting this removal none of the contents shall be allowed to escape while being transferred from the privy to the place of disposal hereinafter specified, so that the least possible annoyance and inconveniences be caused to occupants of the premises or of adjacent premises.

(4) Unless otherwise specifically ordered or permitted by the State Department of Health the excreta collected in the afore-

said receptacles shall when removed be disposed of by burying in trenches or by thoroughly digging into the soil in such place and manner as to effectually prevent them being washed over the surface of the ground by rain or melting snow and at distances not less than two hundred and fifty (250) feet, horizontal measurement, from the high-water mark of any lake, pond or reservoir or from the edge, margin or precipitous bank of any spring, stream, ditch, gutter, drain or watercourse of any kind the waters of which comprise, or when running, flow into the Hackensack or Pascack rivers within the said state.

(5) Whenever it shall be found that owing to the character of the soil or to the surface of the ground or owing to the height or flow of subsoil or surface water or through special local conditions the excremental matter from any privy or aforesaid receptacle or from any trench or place of disposal may, in the opinion of the State Department of Health, be washed over the surface of the ground or through the soil into any lake, pond or reservoir, spring, stream, ditch or gutter, drain or other watercourse the waters of which comprise or when running flow into the aforesaid Hackensack or Pascack rivers within the said state, then the said privy or receptacle for excreta or the said trench or place of disposal shall after due notice to the owner thereof be removed to such greater distance or to such place as shall be considered safe and proper by the State Department of Health.

HOUSE SLOPS, SINK WASTE, LAUNDRY WATER, GARBAGE, REFUSE, ETC.

(6) No sewage, garbage, putrescible matter, house slops, bath water, kitchen or sink waste, refuse or waste water from creameries, cheese factories or laundries or water in which milk cans, utensils, clothes, bedding, carpets or harnesses have been washed or rinsed, nor any polluted water or liquid shall be thrown or discharged directly into any lake, pond, reservoir, spring, stream, ditch, gutter, drain or other watercourse comprising or flowing into the Hackensack or Pascack rivers within the said state,

nor shall any such liquid or solid matter be thrown or discharged upon the surface of the ground or into the ground below the surface in any manner whereby the same may flow into any lake, pond, reservoir, spring, stream, ditch, gutter, drain or watercourse aforesaid within one hundred (100) feet, horizontal measurement, of the high-water mark of any lake, pond or reservoir or of the edge, margin or precipitous bank of any spring, stream, ditch, gutter, drain or other watercourse aforesaid.

(7) No clothing, bedding, carpets, harness, vehicles, tanks, barrels, receptacles, utensils nor animals nor anything that pollutes water shall be washed or rinsed in, nor shall any person bathe in any lake, pond, reservoir, spring, stream, ditch, gutter, drain or other watercourse comprising or flowing into the Hackensack or Pascack rivers within the State of New York.

MANURES, COMPOSTS, ETC.

(8) No stable for cattle or horses, barnyard, hog yard, poultry yard, cattle pen, pigsty, henhouse, hitching place or standing place for horses or other animals and no manure pile, compost heap, piles of fermented or decayed fruit, apple pumice, cider-mill waste, vegetables, roots, grains, leaves or other vegetable substances shall be located, placed or maintained or allowed to remain in such place or manner that the washing or draining therefrom may flow in open, blind or covered drains or channels of any kind into any lake, pond, reservoir, spring, stream, ditch, gutter, drain, or watercourse aforesaid without first having passed over or through such extent of soil as to have become properly purified and in no case shall the above named sources or causes of pollution be so located or allowed to remain that their nearest point is less than one hundred (100) feet, horizontal measurement, from the high-water mark of any lake, pond, reservoir, or the edge, margin, or precipitous bank of any spring, stream, ditch, gutter, drain or watercourse of any kind which comprises or when running flows into the Hackensack or Pascack rivers within the State of New York.

(9) No human excreta or compost containing human excreta shall be spread upon the ground within two hundred and fifty (250) feet, horizontal measurement, of the high-water mark of any lake, pond, or reservoir, or the edge, margin or precipitous bank of any spring, stream, ditch, gutter, drain or watercourse of any kind whose waters comprise or when running flow into the Hackensack or Pascack rivers in the said State, and no manure or compost of any kind shall be spread or deposited upon the ground so as to be washed a less distance than one hundred (100) feet over the surface or through the soil before reaching the nearest point of any such aforesaid lake, pond, reservoir, spring, stream, ditch, gutter, drain or other watercourse.

DEAD ANIMALS, OFFAL, MANUFACTURING WASTE, ETC.

(10) No dead animal, bird, fish nor any part thereof nor any offal or putrescible matter nor any polluted waters or refuse from any slaughter-house, dairy, creamery, cheese factory, cider mill, or other manufactory shall be thrown or allowed to run into any lake, pond, reservoir, spring, stream, ditch, gutter, drain or watercourse whose waters comprise or when running flow into the Hackensack or Pascack rivers in the said State, nor shall any such refuse or polluted material aforesaid be so deposited that any portion thereof or of the polluted drainage therefrom shall be washed over or through the soil a less distance than one hundred (100) feet before reaching the nearest point of any such aforesaid lake, pond, reservoir, spring, stream, ditch, gutter, drain or watercourse.

(11) No dead animal, bird, fish, fowl or reptile, or any part thereof, shall be buried in the ground within two hundred and fifty (250) feet of the high-water mark of any said aforesaid lake, pond or reservoir, or the high-water mark or precipitous bank of any such aforesaid spring, stream or water-course.

(12) No live sheep or other animals shall be washed in any lake, pond, or reservoir, or in any such aforesaid spring, stream or water-course; neither shall any person swim, bathe or wash in any of said lakes, ponds or reservoirs, streams or water-courses.

(13) The waste liquids which may be polluted with putrescible or deleterious organic matter from any of the operations above indicated shall be all thoroughly filtered or otherwise properly purified before being allowed to escape into any lake, pond or reservoir, or into any spring, stream or watercourse tributary thereto.

CEMETERIES

(14) No interment shall be made in any cemetery or other place of burial within two hundred and fifty (250) feet, horizontal measurement, of the high-water mark or precipitous bank of any lake, pond, or reservoir, or of any spring, stream or watercourse whose waters comprise or when running flow into the Hackensack or Pascack rivers within the aforesaid State.

PENALTY

(15) In accordance with section seventy of chapter six hundred sixty-one of the Laws of 1893, as amended by chapter two hundred fifty-one of the Laws of 1899, the penalty for each and every violation of or non-compliance with, any of the above rules and regulations is hereby fixed at two hundred ($200) dollars.

The foregoing rules and regulations for the protection from contamination of the Hackensack and Pascack rivers and their tributaries within the State of New York, were duly made, ordained and established on September 11, 1903, pursuant to chapter six hundred sixty-one (661) of the Laws of the State of New York for 1893, as amended by chapter two hundred fifty-one (251) of the Laws of the State of New York for 1899.

DANIEL LEWIS

State Commissioner of Health

Albany, N. Y., September 11, 1903.

These rules and regulations, to be operative and valid, must first be published at least once each week for six consecutive weeks, in at least one newspaper of the county where the waters to which they relate are located, and the affidavit of the printer, publisher, or proprietor of the newspaper in which such publica-

UNIV. OF MICH.

tion is made, that the publication was so made, together with a copy of the rules and regulations must be filed with the county clerk.

The cost of such publication, affidavit, and filing must be paid by the Spring Valley Water and Supply Company and the Hackensack Water Company.

ALBANY, *September* 23, 1903

The Publishers of the "Rockland County Sentinel," Spring Valley N. Y.:

Gentlemen—I send you herewith enclosed copy of "Rules and regulations for the Hackensack and Pascack rivers and their tributaries within the state of New York," with a request that the same be published in your paper once in each week for six consecutive weeks. Send bill for same to Mr. Robert W. De Forest, President Spring Valley Water Supply Company and the Hackensack Water Company, 30 Broad street, New York city, N. Y., in compliance with the following section of law:

"§ 70. Rules and regulations of State Board [Department] of Health.--The State Board [Department] of Health may make rules and regulations for the protection from contamination of any or all public supplies of potable waters and their sources within the state. If any such rule or regulation relates to a temporary source or act of contamination, any person violating such rule or regulation shall be liable to prosecution for misdemeanor for every such violation, and on conviction shall be punished by a fine not exceeding two hundred dollars, or imprisonment not exceeding one year, or both. If any such rule or regulation relates to a permanent source or act of contamination, said board may impose penalties for the violation thereof or the non-compliance therewith, not exceeding two hundred dollars for every such violation or non-compliance. *Every such rule or regulation shall be published at least once in each week for six consecutive weeks, in at least one newspaper of the county where the waters to which it relates are located. The cost of such publication shall be paid* *by the corporation or municipality benefited by the protection of the water supply, to which the rule or regulation published relates.* The affidavit of the printer, publisher or proprietor of the newspaper in which such rule or regulation is published may be filed, with the rule or regulation published, in the county clerk's office of such county, and such affidavit and rule and regulation shall be conclusive evidence of such publication, and of all the facts therein stated in all courts and places."

After the rules have been published for six consecutive weeks as required by the above section of law, you will please forward a copy of the rules as published, together with your affidavit of publication to this office, in order that the same may be filed in the office of the county clerk of your county.

Please acknowledge receipt.

Very respectfully
DANIEL LEWIS
Commissioner of health

P. S.—It is requested that you send a copy of each issue of your paper containing the rules to Mr. De Forest, at the address given above.

ALBANY, *September* 23, 1903

The Publishers of the "Rockland County Leader," Spring Valley, N. Y.:

Gentlemen—I send you herewith enclosed copy of "Rules and regulations for the Hackensack and Pascack rivers and their tributaries within the state of New York," with the request that the same be published in your paper once in each week for six consecutive weeks. Send bill for same to Mr. Robert W. De Forest, President Spring Valley Water Supply Company and the Hackensack Water Company, 30 Broad street, New York city, N. Y., in compliance with the following section of law:

"§ 70. Rules and regulations of State Board [Department] of Health.—The State Board [Department] of Health may make rules and regulations for the protection from contamination of any or all public supplies of potable waters and their sources within the state. If any such rule or regulation relates to a temporary source or act of contamination, any person violating such rule or regulation shall be liable to prosecution for misdemeanor for every such violation, and on conviction shall be punished by a fine not exceeding two hundred dollars, or imprisonment not exceeding one year, or both. If any such rule or regulation relates to a permanent source or act of contamination, said board may impose penalties for the violation thereof or the non-compliance therewith, not exceeding two hundred dollars for every such violation or non-compliance. *Every such rule or regulation shall be published at least once in each week for six consecutive weeks, in at least one newspaper of the county where the waters to which it relates are located. The cost of such publication shall be paid by the corporation or municipality benefited by the protection of the water supply, to which the rule or regulation published relates.* The affidavit of the printer, publisher or proprietor of the newspaper in which such rule or regulation is published may be filed, with the rule or regulation published, in the county clerk's office of such county, and such affidavit and rule and regulation shall be conclusive evidence of such publication, and of all the facts therein stated in all courts and places."

After the rules have been published for six consecutive weeks as required by the above section of law, you will please forward a copy of the rules as published, together with your affidavit of publication to this office, in order that the same may be filed in the office of the county clerk of your county.

Please acknowledge receipt.

Very respectfully
DANIEL LEWIS
Commissioner of health

P. S.—It is requested that you send a copy of each issue of your paper containing the rules to Mr. De Forest, at the address given above.

ALBANY, *December* 5, 1903

HON. CYRUS M. CRUM, *County Clerk of Rockland County, New City, N. Y.:*

Dear Sir—Enclosed I send you a copy of the "Rules and regulations of the State Department of Health, State of New York, for the Hackensack and Pascack rivers and their tributaries within the state of New York, as approved by the State Department of Health, September 11, 1903," together with the affidavit of L. R. Trumbull, editor and publisher of the "Rockland Sentinel," to the effect that said rules were published in said newspaper once each week for six weeks (commencing on the 3d day of October, 1903, and ending on the 7th day of November, 1903); also affidavit of W. R. Sherwood, editor and publisher of "The Rockland County Leader," to the effect that the rules were published in said newspaper once each week for six weeks (commencing on the 1st day of October, 1903, and ending on the 5th day of November, 1903), according to law.

The rules and affidavits are now sent to you for filing in your office in accordance with the provisions of section 70, article V, of chapter 661, laws of 1893, as amended by chapter 251, laws of 1899.

Please acknowledge receipt.

Very respectfully

DANIEL LEWIS

Commissioner of health

Special Investigations and Reports

SCHOOL BUILDING NO. 12, CITY OF OSWEGO

WAVERLY, N. Y., *February* 9, 1903

DANIEL LEWIS, M. D., *Commissioner of Health, Albany, N. Y.:*

Dear Sir—In accord with instructions received from the State Department of Health February 2, 1903, to visit Oswego, N. Y., and inspect School Building No. 12 and premises, situated at the corner of East Tenth and Catherine streets of that city and report upon the same, I beg to submit the following observations, to wit:

Visited Oswego February 5th instant. Called upon George E. Bullis, secretary and superintendent of schools. With him and John Smith, president of the board of education, visited the school building and premises aforesaid.

The building consists of a one-story frame structure, about 25 feet wide and 75 feet long, 10 feet between joints, with clapboard enclosure. The building rests upon a superficial stone underpinning, without cellar or cellar walls. In its appointments, divided by three frail partitions, the first two of which constitute two front rooms, utilized for school purposes. The other divides the rear room from a narrow hall, which room is used for wood and coal. This room presents a decayed and dilapidated appearance.

It is stated the building was constructed sixty-five or seventy years ago for a schoolhouse, and painted, when Oswego was a village. Its external appearance and internal appointments bear evidence of the truth of said statement. The front rooms are now occupied for a primary department, are cleanly and well kept, but the ventilation a menace to the health of both teachers and pupils. At the time of constructing the building evidently no attention was given to ventilating or heating, and modern improvements of a sanitary character unknown. The closets used are outbuildings of ordinary structure, located near the bank of a small creek, the contents of which leaks through the soil into the creek, with several others in the immediate locality. At the present time the creek banks are full of water. It is alleged during the heated season the creek becomes dry, exposing the sewage along its banks from surface drainage and closets, vitiating and polluting the atmosphere in the locality of the school building to such a degree that at times it becomes extremely offensive, constituting it a nuisance and menace to public health.

See diagram appended.

Sincerely yours
WM. E. JOHNSON
Secretary State Department of Health

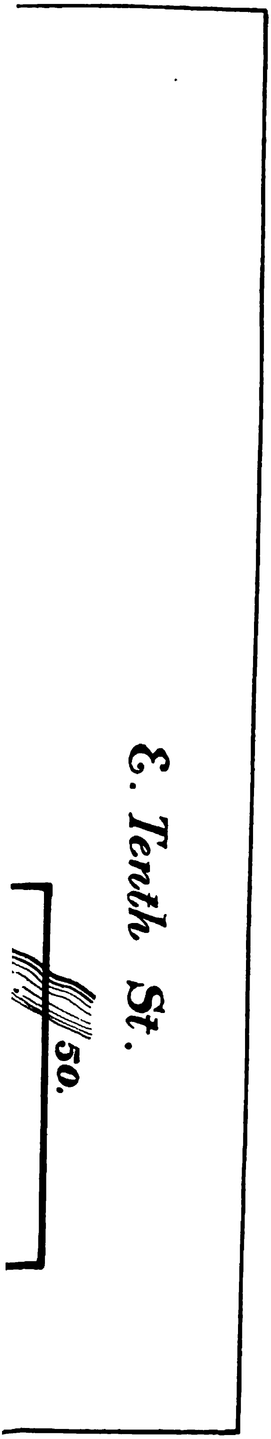
ALBANY, *February* 11, 1903

HON. D. E. AINSWORTH, *Deputy Superintendent of Public Instruction, Capitol, Albany, N. Y.:*

Dear Sir—I enclose herewith for your information copy of a report made by Dr. W. E. Johnson upon his investigation as to the alleged unsanitary condition of School Building No. 12, in the city of Oswego.

In view of the findings of Dr. Johnson, I would advise that the proper authorities provide a suitable school building to replace No. 12, and that the local board of health cause the removal of all privy vaults now located on a small stream which runs under the school building.

Very respectfully
DANIEL LEWIS
Commissioner of Health



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VILLAGE OF WHITESBORO

SCHENECTADY, N. Y., *March* 17, 1903

DR. DANIEL LEWIS, *State Commissioner of Health, Albany, N. Y.:*

Dear Sir—In the matter of the alleged unsanitary conditions existing in the village of Whitesboro, Oneida county, due to an unfinished sewer trench on the land of Mr. H. H. Purdy and others, of which complaints have been received from Mr. Purdy, and which matter was referred to me on the 12th instant for examination, I beg to report that I visited the place on the 13th instant and with Mr. Purdy examined all the conditions complained of, and also met the village president and the village health officer, and at the suggestion of the village president I remained in town to meet the village trustees in the evening to lay the matter before them. I found the complaints of Mr. Purdy were well founded. The village has been for several years at work on a sewer system. During May of 1902 a sewer trench through the side yard of Mr. Purdy was opened and a large cesspool which had been in use for several years was cut through by the trench and the contents thrown out in the yard immediately under the windows of the house without disinfection of any kind. Instead of hastening the work and getting the trench refilled again, the work was allowed to drag along for one reason and another, primarily a want of funds or a proper handling of the work with what funds were available. Several complaints were made to Dr. C. S. Smith, health officer, without avail of any kind. A complaint made to Mr. Cary, village president, was followed soon thereafter by the refilling of the trench, but it was soon reopened and kept open till the present time. After rains or wet weather the trench fills partially full of water and then percolates through the ground and into the cellar. At the time of my visit there was over a foot of water in the cellar, and the furnace fire had been put out and the air supply pipe shut off by the water. A small fire on the top of the cinders was all the heating possible for several days. The water in the trench apparently came through the sewer from the high water in the river and brought some sewage with it into the trench, the water in the trench and river being at the same level at high water. The same trench is also opened through the adjoining property and was there extended through one or more old cesspools abandoned some time ago. The matter from these was also thrown out on the bank without any disinfection whatever. The conditions described as having existed constitute in my opinion a menace to health and a sanitary nuisance on three different grounds: (1) The exposure of the contents of the old cesspools to open-air conditions in such close proximity to a number of residences is in itself dangerous to health; (2) the presence of the water in the trench, apart from its pollution by sewage from the sewers and by the old cesspool matter, is in itself a harmful agency in relation to ground-water conditions and wet cellars, hitherto unknown for many years past; (3) when the ground-water is in itself densely polluted, it becomes a distinct menace to health through its production of impure air in cellars and its possible polluting effect on the wells of the neighborhood, of which there are at least two very near the trench from which water is now being regularly used.

At the meeting of the village trustees in the evening the conditions found to exist were recited to the trustees and the consequences likely to follow their occurrence were explained. After some discussion, during the early part of which a tendency was exhibited of endeavoring to apologize for the conditions on the ground of "no funds" and to allow them to remain till the village could proceed with the work of sewer building under a reorganized contract arrangement, the results of inaction were so emphatically presented to the board that a resolution was finally passed authorizing the sewer inspector to fill up the sewer trench and the health officer was directed to thoroughly disinfect the soil and ground around the trench. Another resolution also instructed the sewer inspector to pump out the water from Mr.

Purdy's cellar. The matter having been put in promising attitude, I requested Mr. Purdy to inform you promptly whether the work directed by the trustees was carried out or not, in order to know what steps next to take, if any.

I trust that the matter will be satisfactorily closed by the carrying out of the resolutions of the village trustees.

Very truly yours
OLIN H. LANDRETH
Consulting Engineer

ALBANY, *April* 8, 1903

The Board of Health of the Village of Whitesboro, Whitesboro, N. Y.:

Gentlemen—Inasmuch as the report of Prof. Olin H. Landreth, consulting engineer of this department, upon the existence of an alleged nuisance caused by the failure of the village authorities of Whitesboro to complete the construction of a certain sewer near the residences of the complainants shows that there is sufficient reason to believe the existing conditions are a menace to the public health, you are hereby directed to convene the board of health and to take the necessary steps to have this nuisance abated on or before April 20, 1903.

DANIEL LEWIS
State commissioner of health

ALBANY, *April* 25, 1903

Mr. PETER WILLIAMS, *President Board of Health, Whitesboro, N. Y.:*

Dear Sir—I am in receipt of your communication of the 24th instant, in which you say, " The village have commenced work on sewers at Purdy's. They have a gang of men there. I will keep track of them and if the work stops I will let you know."

In reply you are informed that under date of April 8, 1903, you were directed to convene the board of health of Whitesboro that it might take the necessary steps to have the nuisance abated on or before April 20, 1903.

Professor Landreth's understanding with you on Saturday last was, that the local board would be convened on that day, when notice would be served upon the village authorities to not only fill in the land on the Purdy property but that on the property of the railroad, which would abate the nuisance of which Mr. Stone complains, the time to be given to the village authorities being two weeks from April 20, 1903. It was also understood by Professor Landreth that in the event of the failure of the village authorities to comply with the orders of the board of health within the time specified such board of health was to complete the work at the expense of the village.

It is therefore insisted that you comply with my instructions of April 8, 1903, by convening the board of health of Whitesboro at once, that it may officially notify the village trustees to carry out the recommendations made by Professor Landreth as to the abatement of certain nuisances. I hereby extend the time for the abatement of such nuisances from April 20 to May 10, 1903, which was the time suggested by you to Professor Landreth.

You are requested to furnish me with a certified copy of the proceedings of the meeting of the board which you are directed to convene.

Very respectfully
DANIEL LEWIS
Commissioner of health

OWASCO CREEK AND SEWAGE OF CITY OF AUBURN

SCHENECTADY, N. Y., *August* 15, 1903

HON. T. M. OSBORNE, *Mayor, Auburn, N. Y.:*

My Dear Sir—Your favor of the 13th instant explaining the reason for the inability to secure a meeting of the common council on the 12th, as you desired, was duly received and the explanation is, of course, quite satisfactory. As the interruption to the proposed meeting of the common council prevented my laying before the members some points concerning which I visited your city and which you desired me to present to the city authorities, I take this opportunity to outline them briefly, since they appear to be of considerable importance to the city and should begin to receive early attention.

As you know, the extremely unsanitary condition of Owasco creek, or outlet, has long been the source of frequent complaints and serious apprehension by people brought most closely in contact with it; and this condition is due almost wholly to the discharge of sewage and manufacturing refuse from the city of Auburn. The evil consequences are felt both in the city and on the stream below the city, and comprise: (1) The serious danger to public health from the aggravated pollution and infection of the waters of the stream as a source of potable water supply, which they are for the village of Port Byron, and farther down stream and to less extent, the village of Phoenix and the city of Oswego. (2) The danger to public health and the depreciation of property values arising from obnoxious odors arising from the stream and from the exposed banks and beds when the waters are drawn down. (3) The danger to public health arising from filth deposited on inundated fields, gardens, yards and cellars, at flood time, to which several portions of the valley of the stream are subject, the floods which are the medium of transportation being also the means by which large deposits of accumulated filth are flushed out of ponds and slack pools in the streams. (4) Injury to property and public convenience arising from such items as the rendering the waters of the stream unfit for agricultural purposes; the injury to fishing; the rendering the waters of the stream unfit for certain manufacturing purposes; the filling up of millponds with foul deposits, and the consequent impairment of pondage capacity, etc. These injuries have been the basis of numerous complaints and investigations in the past and some of them form the basis of the complaints which it was my object to investigate on my visit to the stream this week.

The existing conditions in the stream have been so clearly identified as to leave no doubt as to their character at each time that complaints have been made. As you are doubtless aware, on the occasion of an outbreak of typhoid fever in the city of Auburn in 1891 a complaint of certain suspected conditions submitted by the mayor and the city board of health of Auburn led to an investigation by the State Board of Health during which both the consulting engineer and the secretary of the Board studied the conditions at Auburn, and a comprehensive report was submitted, which report is published in the Twelfth Annual Report of the State Board of Health in 1892. The complaint from the mayor and city board of health contains the following clause:

"By reason of the water in said lake being held back as aforesaid very little water flows down the outlet and through the city, so that the sewage discharged and deposited by the many sewers in said city into said outlet is not carried off, but is left exposed to the action of the sun and air in the very center of the city, forming large ponds of decaying animal and vegetable matter and covering the banks of said stream along its entire length within the limits of the city with sewage from which noxious, foul, offensive and deadly gases and odors arise, contaminating the air and breeding disease and death, endangering the lives and health of the people living along the banks and in the vicinity of said outlet."

This complaint was addressed directly to the governor of the state asking that the state board be directed to investigate the conditions as a necessary preliminary to the governor taking action to abate the unsanitary conditions. The investigation was ordered and made and the report of the consulting engineer, Prof. Charles C. Brown, as concurred in by the secretary, Dr. Lewis Balch, and adopted by the board, contained the following clauses:

"* * * The city of Auburn is not yet completely sewered, and new sewers are constructed from time to time discharging into the outlet, thus increasing the amount of pollution. The tendency is for the millponds to fill up by the deposit of the heavier matters. This tendency will increase. At times of high water there is some tendency to remove these deposits, on account of the larger amount of water flowing and its freer use by the factories through their mill races. The deposits in the eddies and more quiet portions of the ponds are not greatly disturbed, and there is no doubt in my mind that the millponds will become of less value for the storage of water from year to year, on account of this filling up. The nuisance in the dams at times of low water will therefore become greater from year to year. It is impossible to permanently and largely increase the low water flow from the lake, and no manipulation of the flow will stop the deposits of solid matter in the ponds. The preliminary report recommended that the ponds be kept nearly filled. This recommendation was offered for temporary relief only. So long as sewage is discharged into the stream the capabilities of the ponds for producing the nuisance will increase. It will finally become impossible to keep the bottom of the stream covered beyond the possibility of producing the nuisance. It is evident in some places even now that the water itself is so seriously polluted as to become a source of complaint. As the amount of sewage discharged into the stream increases, the pollution of the water will increase, until within a few years the water itself will produce an intolerable nuisance without any aid from the uncovered deposits on the bottom. * * * The indications are therefore unmistakable that the only permanent cure for the present bad conditions of the stream is the removal of all sewage therefrom. This can be accomplished by one or more intercepting sewers which shall take the sewage below the city. It is probable that some method of sewage purification will here be necessary to prevent nuisance to persons residing along the stream below the city. * * * To sum up the results of the investigations:

"(1) We could not trace a connection of the epidemic of typhoid fever with the city water supply.

"(2) It seemed easy to us to connect the epidemic with the polluted condition of the outlet, the sewers and the house connections.

"(3) The condition of the outlet where polluted by sewage is evidently a menace and danger to the public health, which will increase.

"(4) Any manipulation of the state dam or any deepening of the outlet above the dam to increase the low water flow of the stream will be but a partial solution of the difficulty which will hardly be worth what it cost.

"(5) The only complete solution is a removal of the sewage from the stream, which can only be done by building one or more intercepting sewers which shall discharge the sewage below the city and the reconstruction of defective sewers and house connections."

This report so accurately states the conditions and has been so fully verified by experience, as my inspection undoubtedly indicated, that it has seemed proper to quote from it as above. Since it was made on a complaint concerning local conditions in Auburn only, it did not deal with conditions below the city, except to refer to the probable necessity for the construction of disposal works in addition to intercepting sewers. My examination has on the other hand been directed largely to the conditions which prevail on the stream below the city and their cause in the city of Auburn, and originated in complaints of these conditions made to the State Department of Health.

At Port Byron the public water supply, which is taken from the Owasco creek, is absolutely unfit and unsafe for any potable purpose whatever and its use for other purposes in habitations is attended with danger, as it is impossible to thoroughly prevent it occasionally being brought into such situations as to make it an avenue of infection from the foul stream. The residents are compelled to adhere to the use of wells, many of which are unsafe from their proximity to privies and cesspools, as there is no sewer system in the village. In addition to the danger to the water supply, the stream is so foul that the odors from it in warm weather are exceedingly objectionable and even dangerous to health in the cases of individuals of low physical resistance. The driving out of all fish and the injuries to agricultural and manufacturing interests, while serious matters affecting the liability of the city of Auburn for damages covering such injuries, are not strictly matters affecting the public health and therefore only bear on the present consideration in the way of emphasizing the importance to the city of taking early steps to clear itself from such liability by removal of the causes. In view of the serious liability under which the city stands in relation to the public health and property rights of residents and interests on the stream below the city, and also in view of the serious unsanitary condition of the outlet in relation to the public health and interests in the city itself, I consider it of the highest importance that the city should begin at once the steps necessary to relieve these two undesirable relations. Ultimately, and possibly within a short time, this will mean the construction of sewage disposal works for the treatment of the sewage of the city before discharge into the outlet; but before such construction is commenced, it will be necessary to make considerable change in the present system of sewers to accomplish (1) the separation of storm water from sewage proper, in order to reduce the volume of sewage to be treated to a minimum; and (2) to construct some intercepting sewers to unite the present numerous outlets into one or two main outlets in order to reduce the number of disposal plants to the smallest number possible. The storm water can of course be discharged into the nearest watercourse, but all sewage and manufacturing refuse should be kept out of the stream and led to the site of the disposal works. The first cost of these works and the annual cost of operation will be approximately proportional to the volume of sewage treated and to the degree of purification demanded, and will be practically independent of the quality or at least the strength of the sewage; it will therefore be good economy to reduce the volume of sewage to the minimum amount by diversion of all storm water, roof water, and by the reduction of water waste to the least possible. The matter of the introduction of treatment works is simply a question of time, but must inevitably come in the near future. For the present, the important things to consider are the best manner of utilizing the interim in getting ready for the installation, and the taking of the necessary preliminary steps while they can be taken without undue haste. These call for two things, whatever may be the length of time before the actual introduction of disposal works: (1) The preparation and adoption of a very carefully prepared plan for the ultimate sewerage and drainage of the entire city; (2) the strict adherence to this in every new sewer and drain that may be built in future, so that every piece of work done shall be along the proper line. The importance of these two steps is likely to be underestimated; a sewer system, unlike a water system, is dependent wholly on gravity for its operation and has therefore to have every length of sewer laid on a given grade, of a particular size, and these two are dependent wholly on the quantity of sewage which is to be carried by the sewer. Any disturbance from either of these three elements disturbs the efficiency or the economy of the sewer, and also likely the efficiency or the economy of others connected with it. After the careful planning by a competent engineer, no changes from the plan should ever be made unless unavoidable, and then only after the engineer has made the proper changes in the two remaining elements of the design of that sewer and the corresponding changes in the other dependent sewers. A carefully worked-out plan for the sewerage and drainage of the city will in itself obviate the necessity for most of the changes usually made, for the future needs can generally be closely foretold by the engineer.

Since commencing the above, Mr. Ackerman's letter has been received in which he states that you desire an expression of opinion as to the desirability of making a separation of the sewage from the drainage at this time in that portion of East Genesee street which is now to be paved. As I have not yet received your city sewer plans as now built, and as I do not remember the details of this particular sewer from my examination of your sewer map, I am unable to speak very positively; but I may say that unless there are some peculiar circumstances attending the sewer along this street it would seem to be true economy to make whatever changes are ultimately needed at this time before the paving is laid. Only a careful study of the local circumstances will enable one to decide whether the present sewer should be retained for drainage or for sewerage. It may be said, however, that a poor grade of construction in old sewers will usually be more tolerable for drainage than for sewerage. In the matter of the Havens avenue sewer the question of the permit to discharge into the outlet will be passed on as soon as your sewer map is received. The granting of the permit will, however, undoubtedly answer as a temporary expedient, to be changed as soon as circumstances will warrant. Concerning the cooperation proposed between the city and the town of Owasco in the construction of this sewer, it would seem very desirable on sanitary grounds that the residents on the town side of the avenue should have sewerage facilities without waiting for annexation of this territory to the city. The particular form of cooperation by which this may be secured is, however, a matter of local adjustment between the two municipalities.

The sewer law for unincorporated villages enacted in 1901 would seem the best way for the residents of the town to exercise their efforts to the desired end. To use this law, however, it would probably be necessary for the town to build one portion and the city another, and in order to do this in strict accordance with this law the town would probably have to build its portion on territory entirely outside the city, i. e., on the town side of the dividing boundary line.

I am, dear sir, very truly yours

OLIN H. LANDRETH

Consulting engineer

BALDWIN, L. I.

Hon. DANIEL LEWIS, M. D., *State Commissioner of Health, Albany, N. Y.:*

Sir—In accordance with your instructions I have examined the sanitary conditions at Baldwin, Long Island, as affected by the ponds created by the damming of the waters of Parsonage creek.

Parsonage creek is a stream about three miles long which is fed by springs from the Main Spring of Long Island, the sources being about 30 feet above tide level and additional water flowing into it for two miles of its course, or until it reaches the level of the tidal marshes about a mile from its entrance into Hempstead Bay. At the head of the tide marsh the stream is crossed by the highway from Baldwin to Oceanside.

At this point the stream is dammed, raising the water about 8 feet and creating a pond about half a mile long. Flash boards on this dam enable the pond level to be raised or lowered several feet.

This pond is Y-shaped, the stream dividing into two branches a few hundred feet above the dam. The east branch extends northwardly along the west side of the highway, being close to it in some places and about 300 feet distant from it at the upper end. Both sides of this road are occupied by residences. The bed of the stream is sandy and the overflowed land is meadow and marsh, on which water lilies and other aquatic plants grow where the water is shallow. The bottom is slimy and muddy.

It is complained that at times the flash boards are removed from the dam and portions of the bottom laid bare for several days at a time and that very offensive odors arise from the pond at such times and mosquitoes abound in the vicinity.

The west branch of the stream flows in a northwesterly direction through farming land and crosses the Long Island railroad just east of Milburn reservoir. Directly along the stream the land is low and marshy and in many places quite thickly grown up with trees and underbrush.

A few hundred feet above the fork of the Y in the main pond, which is designated as *A* on the accompanying map, there is another dam about six feet high, with stop plank by which the height of the water above it can be regulated. This forms the pond designated *B* on the map.

At the time of the two inspections which I have made of the premises the stop planks have been so arranged as to give a depth of two feet directly above the dam, flooding an area of about an acre and leaving the remainder of the marshy flat adjoining the stream exposed, with the stream meandering through it. The whole tract of probably five acres is grown over with marsh grass, weeds and water lilies. The surface is slimy and is offensive to sight and smell and affords a ready breeding ground for mosquitoes. In its present condition I look upon this pond as a nuisance to the neighborhood. This nuisance may be abated in one of two ways:

By placing additional flash boards on the dam and raising the water level three or four feet and keeping it at that level there would probably be no offence to the neighborhood. That condition existed for many years and until quite recently, I understand.

Or, the dam could be removed entirely and the stream allowed to flow in its natural channel. The marsh lands, in such case, should be cleaned and disinfected and kept properly drained.

Either of these methods would doubtless remove the offensive and unsanitary condition which now exists.

Respectfully submitted.

J. J. R. CROES

Consulting engineer

HON. DANIEL LEWIS, M. D., *State Commissioner of Health, Albany, N. Y.:*

Sir—Under your instructions of September 7th I have examined further into the conditions existing at Baldwin, Long Island.

I examined the ponds on September 12th in company with Judge Hogan and Mr. Joshua Baker Macauley, who resides on the property of Mr. John Fox, just west of the pond, near its outlet.

The water level in the lower pond was about a foot higher than on the occasion of my previous examination. The dam between the two ponds had been raised by flash boards so that the water was about three and a half feet deep above the dam and there was nothing objectionable apparent to sight or smell. Following up the stream to and across the Merrick road, which is about a quarter of a mile above the dam, the water in the stream runs clear and looks pure. About one hundred feet north of the Merrick road there is, however, a drainpipe from the residence of G. A. Barker which evidently discharges from a water-closet directly into the stream.

Upon inquiry I found that Mr. Macauley uses ice which he cut from the pond adjoining the premises which he occupies. During the month of July Mrs. Macauley was in a nervous condition and drank a great deal of iced water and tea. In the second week in August she was taken down with typhoid fever. The water used by this family is drawn from a well which is not near any source of pollution. The pond from which the ice used is procured receives the drainage above mentioned and there is the possibility of objectionable surface drainage from three-quarters of a mile of the upper portion of the stream. It is not fit for an ice supply.

Along the stream which feeds the main or east pond, which extends a mile and a quarter north of the Merrick road, I did not find any privies discharging directly into the stream. There are cesspools thirty to fifty feet from the stream, in porous soil, and at Baldwin station there is a stable yard near the brook.

The water of these ponds is not fit for human consumption, either as drinking or cooking water or ice.

The possibility of removing some of the objectionable qualities of the pond water by a system of house sewers has been considered. It is not practicable. The ground adjacent to the houses lies so low that a sewer system discharging by gravity into tidewater is not possible. The sewage would have to be carried into a sunken tank and pumped out continuously, and to prevent its being a nuisance on the tide marshes it would have to be purified by some expensive method before its discharge. This may have to be done eventually, but is not necessary now.

What is essential now is that the ponds should be kept full and clean and the use of the water and ice forbidden for domestic purposes.

Respectfully submitted.

J. J. R. CROES
Consulting engineer

ALBANY, *October* 8, 1903

Mr. GIBDELL V. BROWER, *President Board of Health, Town of Hempstead, Oceanside, Long Island, N. Y.:*

Dear Sir—I enclose herewith copy of a report made to this department by J. J. R. Croes, consulting engineer, upon his further examination into the conditions existing at Baldwin.

In view of the evident danger from use of ice from the pond you are hereby directed, as provided by section 25 of the Public Health Law, to convene the board of health of the town of Hempstead that it may take action prohibiting the use for domestic purposes of ice taken from the ponds at Baldwin. It is further directed that the ponds referred to be kept full of water.

Very respectfully
DANIEL LEWIS
Commissioner of health

ALBANY, *December* 4, 1903

Mr. J. J. R. CROES, *Morris Building, 68 Broad Street, New York City:*

Dear Sir—Under date of September 23, 1903, you made a report to this department covering your further examination into the conditions existing at Baldwin, L. I., concerning certain ponds.

I am advised by the secretary of the board of health of the town of Hempstead that there are two ponds located on the property of Mr. Barker and the owner is desirous of cutting ice from such ponds for domestic use.

As the Barker ponds are not specified in your report, will you kindly advise me whether in your judgment permission should be given for the use of ice from said ponds, Mr. Weeks, the secretary of the local board, stating to me that in his judgment the ponds referred to are free from all sources of pollution?

Very respectfully
DANIEL LEWIS
Commissioner of health

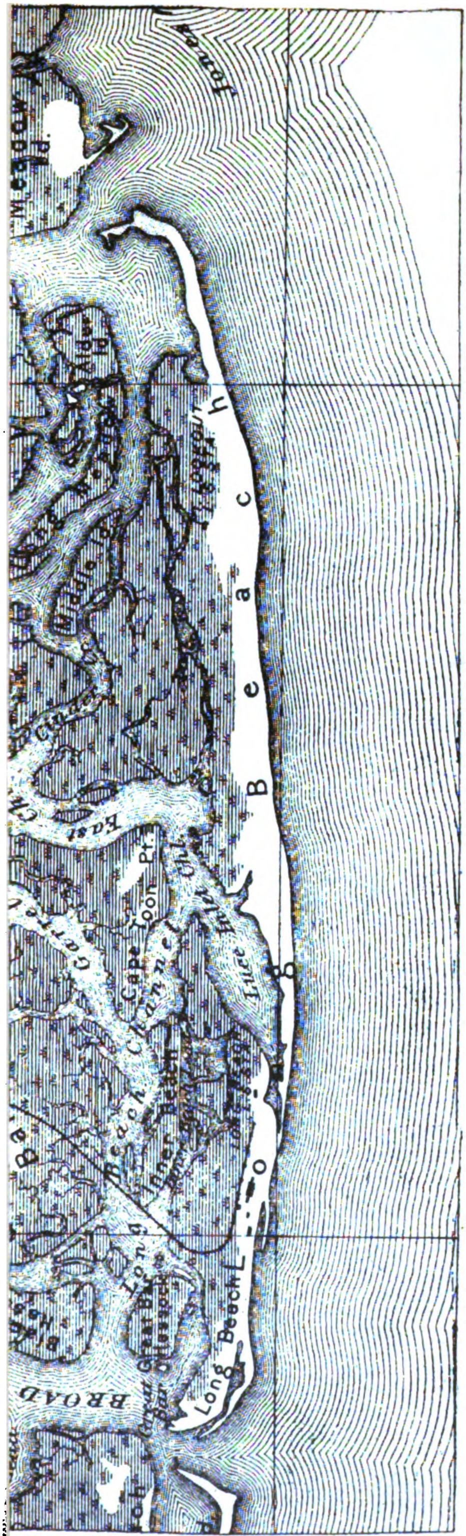
Hon. DANIEL LEWIS, M. D., *State Health Commissioner, Albany, N. Y.:*

Dear Sir—The ponds on the property of Mr. Barker at Baldwin, L. I., were not called to my attention when I was examining the ponds lower down the stream which were complained of in August last.

They must lie north of the Merrick road and on the west fork of Parsonage creek, which runs down east of Millburn reservoir, as may be seen on the map accompanying my report of August 6th.

This whole region is quite thickly settled and has no sewerage. I can not say from observation that there is any sewage flowing directly into this stream, but the probability of such pollution existing in a spring stream flowing through a territory situated as this is is so great that I have no hesitation in advising that the use of ice for domestic consumption from this stream should be absolutely forbidden as dangerous to health. If you so wish, I will examine this stream in detail, but I do not consider it necessary.

Very respectfully, your obedient servant
J. J. R. CROES
Consulting engineer


Long Beach
Long Beach
Beach Haven
Inlet
Beach Channel
Inner Beach Channel
Cape Loon Pt.
East Chan.
Middle Id.
BROAD
Great Bay
Great Bay Shoal
Big Has

UNIV. OF MICH.

VILLAGE OF CANASTOTA

CANASTOTA, N. Y., *November* 7, 1903

State Board of Health, Albany, N. Y.:

Gentlemen—I send you herewith affidavits of residents on Barlow street, Canastota, N. Y., also certificate of Dr. William Taylor, health officer, relative to the conditions existing on Barlow street and vicinity.

This is pursuant to the statute of the Public Health Law and trust it will meet with your earliest consideration.

Kindly advise me what action your body will take in the matter and oblige.

Yours, etc.

L. A. PARKHURST

Office of Health Officer, Canastota Village, N. Y.:

This is to certify that I have been a resident of the village of Canastota, N. Y., and have practiced my profession as physician and surgeon therein during the past thirty years and am now health officer for the said village of Canastota, N. Y., and am well acquainted with the conditions now existing on Barlow street in said village; that since the enlargement or deepening of the Erie canal a few years ago the cellars of all the residences of Barlow street are filled with water when the canal is full of water, the water from the canal percolating through the soil into the cellars on said Barlow street, rendering them unhealthy and dangerous to the lives of the people living on said Barlow street. There is only one remedy for the correction of this dangerous condition, and that is a sewer through the length of said Barlow street deep enough below the surface of the soil to thoroughly drain these cellars.

Respectfully submitted.

WM. TAYLOR, M. D.

Health officer

State of New York, County of Madison, ss:

Frank E. Hooper, being duly sworn, deposes and says that he resides at No. 121 Barlow street, in the village of Canastota, N. Y., and is a tenant of John H. Castle, of Canastota, N. Y.; that he has resided at No. 121 aforesaid for about one year last past.

That during the time of his residence as aforesaid he has been troubled with rheumatism and malarial fever and for the last two weeks past he has been confined to the house with malarial fever as the doctor informs him and as he verily believes.

That the cellar of the house in which he resides contains a quantity of standing and stagnant water and has during the term of his residence.

That deponent believes his sickness is caused by the water standing in the cellar of said house.

Deponent further says that the odor and stench from the stagnant water in the cellar of said house is so strong that it is necessary for him and his family to open windows and doors.

Deponent further says that he believes the water standing in the cellar of said house leaches through the subsoil of the land between Barlow street and the Erie canal from the Erie canal.

That deponent verily believes that the conditions as existing are detrimental to the health and dangerous to the lives of the inhabitants of said Barlow street.

FRANK E. HOOPER

Subscribed and sworn to before me this 16th day of September, 1903.

L. A. PARKHURST
Notary public

State of New York, County of Madison, ss:

William Henry Schuyler, being duly sworn, deposes and says that he owns a house and lot and resides at No. 6 Barlow street, Canastota, N. Y., and that he has lived there for the last six or seven years; that during the time of his said residence water has stood under his house in a hole he dug for the purpose of a cellar and storage place.

Deponent further says that during the winter time there is practically no water under his house and that during the summer time when the canal is filled that water stands under his house and becomes stagnant and unhealthy.

That deponent and his wife have been troubled with rheumatism and malaria for some years or during the greater part of their residence on said Barlow street and that deponent believes the sicknesses aforesaid are caused by the water standing under his house.

Deponent further says that he is familiar with the subsoil of the land lying between Barlow street and the Erie canal; that the same is composed of quicksand and gravel, and deponent believes water leaches from the Erie canal through said subsoil of quicksand and gravel, and that the same stands in the cellar of the residences located on said Barlow street in the said village.

Deponent further says that he believes that the conditions as existing on said Barlow street are detrimental to the lives and dangerous to the health of the inhabitants thereof.

W. H. SCHUYLER

Subscribed and sworn to before me this 11th day of September, 1903.

L. A. PARKHURST
Notary public

State of New York, County of Madison, ss:

John B. Scheid, being duly sworn, deposes and says that he owns and occupies a house at No. 129 Barlow street, in the village of Canastota, Madison county, New York, and that he has owned and occupied said house for about seven years last past.

That during the past year and during nearly all of the seven years deponent has occupied said house water has accumulated and stood in the cellar of the house occupied by deponent.

That the water in deponent's cellar as aforesaid is from 1½ to 2 feet in depth.

That deponent and his wife are and have been sick and troubled with rheumatism and malaria, all of which as deponent believes is the result of the water standing in the cellar as aforesaid.

That deponent is familiar with the subsoil of the land between Barlow street and the Erie canal and that the same is gravel and quicksand, and deponent verily believes that the water of the Erie canal leaches through the said subsoil of gravel and quicksand and accumulates and stands in the cellar of deponent's house and other cellars in the vicinity, as the cellars on said street, as deponent believes, are lower than the surface of the water in the Erie canal.

That deponent verily believes that the conditions as existing are detrimental to the health and dangerous to the lives of the inhabitants of said Barlow street.

JOHN B. SCHEID

Sworn to before me this 1st day of September, 1903.

L. A. PARKHURST
Notary public

State of New York, County of Madison, ss:

John H. Castle, being duly sworn, deposes and says that he resides at Canastota, Madison county, New York, and that he owns a house and lot on Barlow street, in said village, at No. 123, and that he has owned the same for more than a year past.

That the cellar under said house has from 1 foot to 1½ feet of water therein during nearly all of his said ownership of the same.

That Frank Hooper resides in and occupies the said house and lot and has for about one year last past. That from the stagnant water in said cellar said Hooper is and has been troubled with rheumatism and malaria and other sicknesses, and as deponent verily believes the same is caused by the water which stands in the cellar of said house becoming stagnant.

That the subsoil in Barlow street and vicinity is of gravel and quicksand.

That deponent verily believes that the water in the cellar aforesaid comes from the Erie canal and leaches through the quicksand and gravel subsoil.

That deponent is familiar with other dwellings and cellars on said street and that all, or nearly all, contain from one foot to three feet of water, and that said water comes from the Erie canal as aforesaid.

Deponent further says that he believes that said conditions are detrimental to the health and dangerous to the lives of the inhabitants living on said Barlow street.

JOHN H. CASTLE

Sworn to before me this 31st day of August, 1903.

L. A. PARKHURST
Notary public

Albany, *December* 2, 1903

Dr. Daniel Lewis, *Commissioner of Health, Albany, N. Y.:*

Dear Sir—Referring again to your letter of the 17th ultimo, bearing on the subject of the complaints on the part of residents of the village of Canastota, and certificate of the health officer of said village, Dr. William Taylor, with reference to the unsanitary conditions alleged to have resulted from the seepage of water from the canal into the cellars of complainants located on Barlow street, I have to say that I have caused a careful investigation to be made, and as a result am compelled to reach the conclusion that the state is in no way responsible for the conditions complained of as the complainants have seen fit to construct their houses on low ground and dig cellars without providing for drainage, and as you will see on reading the report made by an inspector who has investigated the matter carefully, a copy of which I inclose herewith, the conditions resulting are such as might be expected.

I inclose also tracing showing location of the structures with reference to the canal.

In view of the conditions as I believe them to exist, I do not feel that this department can take any action in the matter.

Yours very truly
CHAS. S. BOYD
Superintendent of public works

(Inclosures.)

ALBANY, *November* 30, 1903

Hon. C. S. BOYD, *Superintendent of Public Works, Albany, N. Y.:*

Dear Sir—I have examined the premises in question and the adjacent locality and herein report relative to the same, reference being made to the attached map.

The houses referred to in the various affidavits submitted are located on the south side of Barlow street, the minimum distance from the Erie canal being about 300 feet and the maximum distance being about 675 feet. There are twenty-six buildings on the south side of the street, including the three houses in question, and the north side of the street is well built up with dwellings. There are also many dwellings existing on the remaining territory between said Barlow street and the canal. The territory in question is very flat, affording very poor natural surface drainage and much of the water falling during periods of rainfall soaks into the ground instead of flowing off to some lower point.

There is no sewer in Barlow street, consequently any water percolating through the soil and entering any cellar remains there until it dries up. On the date of the examination (November 25, 1903) the surface of the ground throughout Barlow street and along the south side thereof was dry.

Relating to the premises indicated by the affidavits presented, I submit the following:

William Henry Schuyler owns and occupies house No. 6, located near the west end of said Barlow street. It is a small wooden structure one and one-half stories in height and sets on the ground or nearly so. There was no water under it or around it and the lot on which it is situated was dry. No cellar exists beneath the house and a low embankment has been thrown up around the outside of it to keep the living rooms warm and perhaps to keep surface water from rainfall from settling beneath the house. It is but natural that the rheumatism and malaria complained of should be invited by the existing conditions.

John B. Scheid owns and occupies house No. 129 Barlow street, which is located several hundred feet east of the Schuyler house aforesaid. It is a wooden structure two stories in height, the bottom of the cellar being about 4 feet below the surface of the adjacent ground. Two inches of water existed in the bottom of the cellar, the adjacent grounds being dry.

John H. Castle owns house No. 121, which is located a short distance east of the aforesaid house owned by John B. Scheid. It is two stories in height and occupied by a tenant. The former tenant, Frank E. Hooper, whose affidavit was submitted, has moved out and the lower story is now occupied by Frank Cole, who moved in November 18, 1903. There is a small stone cistern in the cellar built of rubble masonry. The lower portion of the cellar wall for about 2½ feet in height seems to be very porous, showing but little cement in the walls and indicating that water from the outside has soaked through them. There was 1 inch in depth of water in the front part of the cellar, the remaining portion of the lot being dry. Mr. Cole (the tenant) informed me that he was told by Mr. Castle (the owner) that the cistern aforesaid leaked and that when about one-half full the water would escape from it. This, with the natural soakage of rainfall, will account for the 1 inch of water existing at the present time on the cellar bottom. I was informed by a resident of that locality that on account of the flatness of the land it had for a great many years been wet, but that he did not consider that it was due in any sense to the presence of the Erie canal in the vicinity thereof.

I do not think that the water in the canal has or ever had anything to do with the existing conditions on the several properties mentioned in the affidavits submitted, but that such conditions generally have been caused from rainfall and the natural seepage of the water through the soil due to the same and the negligence of said property owners in not providing a drain in the street for the proper drainage of said property.

The great distance from the canal and the many intervening cellars precludes the probability of any water from the canal reaching said property.

Respectfully yours
OSCAR H. PEACOCK
Inspector

VILLAGE OF OSSINING

SCHENECTADY, N. Y., *July* 30, 1903

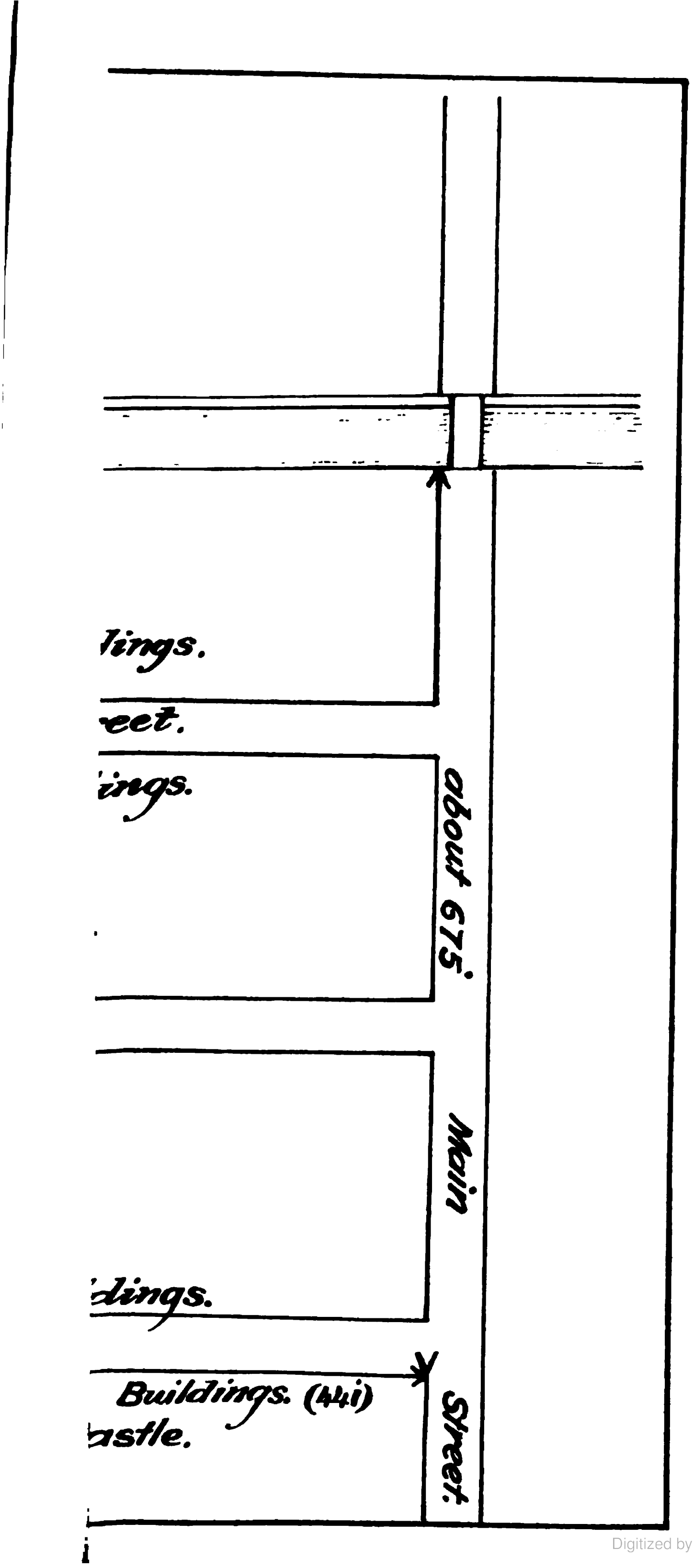
DR. DANIEL LEWIS, *State Commissioner of Health, Albany, N. Y.:*

Dear Sir—In the matter of the alleged defective condition of the sewer system of the village of Ossining, N. Y., which you requested me to investigate, I beg to report as follows:

I visited the village on June 17th and in company with the secretary of the village board of health and the village health officer I examined the local conditions complained of and beg to report as follows as the result of my examination:

MAIN STREET SEWER

I found the conditions to be as alleged in the complaint of Secretary Feeney of April 18th. The cutting of the artificial outlet has apparently aggravated and extended the filling up of the outer portion of the pipe, but it was impossible to determine, without a more extensive examination than I was able to give it, whether the portion of the sewer between the artificial opening and the outer end was entirely filled with silt or whether there was any hope or possibility of cleaning or flushing it out in places and extending it for use again by closing the artificial opening. This matter requires further examination by an engineer on the ground. Should it appear as the result of a closer



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examination that this outlet can not be restored and the pipe extended, then the question of a new location for the outlet of this sewer by diversion to another point of discharge would be a pertinent subject for further examination.

BROADWAY AND SNOWDEN AVENUE SEWER

The conditions found to exist at the lower end of this sewer are substantially as alleged by Mr. Feeney. The insufficient capacity of the outlet arises from the fact that it has an 18-inch pipe laid on the very flat grade but receives sewage and storm water from an 18-inch sewer, a 12-inch sewer and a 10-inch sewer, all laid on steeper grades. Since two if not all of these three entering sewers are said at times to flow to their full capacity it is quite evident that the water is brought to the manhole more rapidly than an 18-inch outlet sewer can carry it away to the river. Presuming that the most feasible remedy for this condition will be the laying of an additional outlet from this manhole to the river, the proper diameter, grade, and location of outlet end of this new outlet should receive careful attention by an engineer after a survey and examination of the river bank at this point and of the drainage area and sewage tributary to the three contributant sewers.

CROTON AVENUE SEWER

I found that it was desirable to extend the Croton avenue sewer as far as the corporation line not only to provide an outlet for the Linden avenue sewer, which has already been laid but which is not used because it has no outlet, but also in order to furnish sewerage for a number of residences situated above the present upper end of the Croton avenue sewer. The present conditions about some of these residences which have no sewerage are extremely unsanitary and in one or more instances constitute actual nuisances.

The conditions alleged and found to exist are extremely unsatisfactory and should be remedied with the least delay possible. There seems to be little excuse for their occurrence and none whatever for their retention. The property valuation in the village is about $5,000,000, indicating a debt limit of $500,000. The village has outstanding water bonds aggregating about $180,000 and street bonds amounting to about $5,000. Since, as I was informed, the water department is self-sustaining and the people are not taxed for its maintenance nor for the interest on its bonds, this bonded debt is not to be counted in considering the debt limit, so that there would seem to be no financial difficulty in the way of carrying out the needed sewer improvements even though a bond issue were necessary to provide the funds therefor.

Since each of the three sewers above considered will require engineering attention in the study and preparation for plans for their improvement, I beg to recommend that the village board of trustees be directed to secure such engineering examinations and plans and that the same be forwarded to you for your approval.

I am, dear sir, very truly yours

OLIN H. LANDRETH,
Consulting engineer

VILLAGE OF WESTFIELD

SCHENECTADY, N. Y., *July* 30, 1903

DR. DANIEL LEWIS, *State Commissioner of Health, Albany, N. Y.*:

Dear Sir—In the matter of the unsanitary conditions existing in the village of Westfield, Chautauqua county, N. Y., as indicated by communications from Mr. S. A. Ferrin, president of the board of health of the village, and Dr. Thomas E. Soules, proprietor of the Soules Hospital and Training School for Nurses, I beg to report that I visited Westfield for the purpose of looking into the local conditions there on July 25th and found the following conditions to exist:

Westfield is a village of about 3,000 inhabitants situated on Lake Erie at the mouth of Chautauqua creek. The village is a rather old one, having celebrated its hundredth anniversary last year. It has a public water system owned by the village which has been in use for several years and which furnishes water for four-fifths at least of the inhabitants. The topography has a strong slope toward Lake Erie and toward Chautauqua creek and another small stream flowing through the village toward the lake. The soil is rather porous at the surface with strata of impervious hardpan lying at depths varying from 10 to 20 feet below the surface, though in places shallower and occasionally outcropping. With one or two exceptions there is little trouble from defective surface drainage, and in these instances proper artificial drainage can easily be secured independently of sewerage. At a number of places in the village trouble has been experienced from cesspools outliving their usefulness, with the usual unsanitary results following. In a number of places wells still in use are dangerously near to some of the old cesspools, and the absence of adequate means of disposing of refuse has led to the habit of throwing slops and wash water about the residences with the result that in a number of places its presence was noticed in alleys and street gutters.

The village is very pleasantly situated; has fine transportation facilities by the Lake Shore and Michigan Southern railroad, the New York, Chicago and St. Louis railroad, and the Jamestown, Chautauqua and Lake Erie railroad; it is well provided with churches and schools, and these circumstances, in connection with its proximity to Chautauqua creek, would seem to render it an attractive place for residence. The absence of sewerage and street paving and curbing appear to be the most striking physical deficiencies.

The financial condition of the village furnishes no obstacle toward the supplying of a system of sewerage. The property valuation in the village is about $1,500,000. There are outstanding water bonds aggregating $96,000, electric light bonds $2,000, school bonds $41,000, but the water system pays all expenses of operation and capital charges and the village has recently become the beneficiary of a bequest which is expected to pay not only the interest on the school debt but also to pay a part at least of the face of the school bonds as they mature.

The village officials and other prominent gentlemen whom I met seem without exception to appreciate the value and need of a sewer system, but were somewhat in doubt as to the attitude which the taxpayers in general would assume on the question of the construction of the sewer system.

Chautauqua creek between the village and Lake Erie is used for agricultural purposes and at its mouth are attractive sites for summer cottages and an attractive lake beach, and the place had already been improved to some extent. The owner values the land largely for summer resort purposes. From these circumstances it would not be permissible to discharge the sewage of the village untreated into the stream, but the rocky and gravelly nature of the bed and channel of the stream with its decided fall giving it ample opportunity for aeration render it probable that sewage could be turned into the stream without harm after a moderate degree of purification.

In general there appears no engineering or other difficulty whatever in the way of securing a thoroughly satisfactory and economical sewer system for the village; and the decided advantages which would arise therefrom due to the decided improvement in sanitary conditions, the increased attractiveness of the village to outsiders as a desirable place of residence, and the general enhancement in values, constitute advantages which would seem to clearly warrant the moderate expenditure which a sewer system would necessitate. The determining element in the question as to whether a sewer system should be built or not is the probable cost of the system. This can not be accurately ascertained without surveys and plans, and with such plans the village would be in position to determine intelligently whether it should proceed to build the entire system at once, or to proceed gradually, building a portion from time to time, or should defer the matter altogether. Since the village law does not permit any steps toward acquiring a sewer system to be taken until a complete plan for a permanent and comprehensive system has first been secured and as the cost of such a plan would be very moderate it would appear that the proper step for the village to pursue would be, first, to secure a complete topographical survey of the village and the plans for a modern up-to-date system of sewerage and the necessary sewage disposal, together with specifications and an estimate of cost. The village would then be in position to determine the question of the complete or partial construction of the system and could also then decide whether the portions built should be constructed as a general expense on the entire village or should be assessed on the property immediately benefited, or by a combination of the two methods. All this the village sewer law clearly permits and provides for.

Inasmuch as the particular conditions which form the occasion of the present inquiry can not be rectified properly in any other way than by proper sewerage and for the general reasons stated above, I beg to recommend that the village board of health be advised to certify to the village trustees the needs of a public sewer system under the authority given them by the last paragraph of section 21 of the Public Health Law as amended by chapter 383 of the Laws of 1903, and that the village trustees be advised to secure a topographical survey and plans, specifications and estimates of a comprehensive sewer system and that the same be submitted when complete to the State Department of Health for approval in accordance with section 260 of the Village Sewer Law.

In the matter of the unsanitary conditions on which specific complaints have been made, I may say in explanation that I found the complaints fully verified and advised the responsible parties as well as the village board of health how temporary relief might be secured. A permanent remedy is out of the question by any other means than a public sewer system.

I am, dear sir, very truly yours,

OLIN H. LANDRETH

Consulting engineer

ALBANY, *August* 3, 1903

Mr. S. A. FERRIN, *President Board of Health, Westfield, N. Y.:*

Dear Sir—For your information, as well as that of the citizens of the village of Westfield, I enclose herewith copy of a report made to this department by its consulting engineer, Professor Olin H. Landreth, covering a recent investigation made by him as to the unsanitary conditions existing in the village of Westfield, with the request that the board of health of the village of Westfield comply with the recommendations made by Professor Landreth by certifying to the village trustees the needs of a public sewer system.

Very respectfully
T. A. STUART
Acting commissioner of health

VILLAGE OF BRONXVILLE

Lawrence Park

SCHENECTADY, N. Y., *December* 2, 1903

Dr. DANIEL LEWIS, *State Commissioner of Health, Albany, N. Y.:*

Dear Sir—Agreeable to your request, I beg to submit the following report of my recent examination into sanitary conditions in the village of Bronxville, Westchester county, New York:

I visited Bronxville on November 23d and made an examination of the local conditions in company with Dr. J. W. Smith, health officer, and Mr. C. I. Marvin, president of the village board of health.

The matter on which an examination was desired was the sewerage of Lawrence Park, a private residence park within the village of Bronxville, comprising a very desirable and high-class residence district and having at present about sixty residences. The park occupies a prominent rocky knoll and has an excellent system of drives leading through it. It also has a public water system, the water for which is procured from the New Rochelle Water Company.

The village of Bronxville has recently built a portion of its public sewer system and its sewage disposal works. Some fifteen or twenty of the residences in the park are connected with the village sewer system, but the others are not so connected and depend for sewerage on cesspools, several of which accommodate single residences while others accommodate two or more residences. Among the latter there are several large cesspools which receive the sewage from a number of residences, and which have been moved or rather old ones abandoned and new ones constructed on several occasions. At the site of most of the cesspools the soil is unsuitable for proper disposal and in the only locality where it is at all promising the cesspools have been improperly and inadequately built, so that even here the resulting conditions are extremely unsatisfactory and unsanitary. At many of the cesspools there is either an overflow onto the surface of the ground or a pipe connection to or part way to the drainage ditch which was cut through the property some years age by a town drainage commission, and which ditch discharges directly into Bronx river. At the time of my inspection one of these pipe connections was being taken up and replaced by a larger one; and at another point a connection with the ditch had recently been discontinued and the pipe instead had been run to the blind end along the bank of the ditch.

The entire construction of the scheme of disposal here is extremely crude, imperfect, unsanitary and not at all in keeping with the character of the residences and with the other public improvements.

While I understand that no official action has been taken by the present board of health to declare the conditions existing with regard to sewage disposal in Lawrence Park to be a nuisance they constitute such in fact and the board would in my opinion be fully justified in so declaring them officially.

Some years ago this same matter was the subject of examination by the State Department of Health on the complaint of the board of health of the village and the owner of the park, Mr. W. V. Lawrence, then presented as a ground for maintaining cesspools within the park that the village had no public sewer system and that the village should be compelled to build such a system and sewage disposal works. Notwithstanding the fact that the village outside the park was not in pressing need of sewerage a sewer system including disposal works was planned and a large portion of the system including the disposal works was constructed during the year 1902, largely to meet the needs of the residents of Lawrence Park, which, however, they have not materially taken advantage of. The plans for this system were approved on May 14, 1902, and comprise, first, a high-level system, which, including the disposal plant, can be operated by gravity, and second, a low-level system, which was planned to flow by gravity to a collecting well at the disposal plant, from which well the sewage was to be pumped to the necessary height to allow it to flow through the disposal works. The portion of the system built thus far does not include the low-level system and there are certain portions of the village, including most of the streets in Bronx Manor, on the west of the railroad and Midland avenue, Elm Rock Road and the lowest portions of Lawrence Park east of the railroad, which can not be sewered until the low-level system is built. The high-level system, however, provides for the sewerage of nearly all of the residences in Lawrence Park, and in order to provide these residences with sewerage there only needs to be built the high-level sewer in Lawrence Park. The high-level sewer in Ponfield Road outside the park into which the necessary Lawrence Park sewer would need to discharge is already completed and ready for the Lawrence Park sewer to be connected with it. As before stated, this necessary high-level sewer within the park is shown on the general sewer map approved May 14, 1902, as skirting along the base of the hill in Lawrence Park and entering the village system at the park entrance southeast of the railroad depot, and there would seem no reason for further delaying the construction of this sewer within the park and of such other park sewers leading to it as are necessary to provide sewerage for all the park residences which are high enough to be sewered into it, and which comprise the great majority of the residences within the park.

There are, as before stated, a few residences in the park which are too low to be sewered into this high-level system and which must wait for sewerage facilities until the low-level system is built, for which there seems at present no extensive demand, or they must be provided with individual means of disposal which is entirely feasible as a temporary expedient pending the construction of the low-level system if planned on modern sanitary lines.

As to who is responsible for the building of the sewers within the park I am unable to say, as legal questions are involved which should be carefully looked into by an attorney, and the necessary improvements carried out in accordance with the findings of such an examination.

In conclusion I beg to recommend as follows: First, that the board of health of the village of Bronxville be advised to give official consideration to the matter of the sanitary condition attending the use of cesspools and the present means of sewage disposal within the park and if it finds such to constitute a nuisance or to be detrimental or a menace to the health of the neighboring residents that it shall so officially declare the same.

Second, if the board of health shall find the existing conditions as to the present disposal of sewage within the park to constitute a nuisance or a menace to health, and if it shall deem the construction of sewers to connect the residences of the park with the village system of sewers to be a sanitary necessity, that it shall then secure competent legal advice on the questions, first, as to who is responsible for the construction of such sewers, and, second, as to what steps and procedure are necessary to be taken to bring about their construction. I do not consider it desirable on economic grounds to require the construction of the low-level village system before Lawrence Park can be sewered;

nor even if it were constructed is it economical to lead the sewage of the high-level portions of the park into such low-level system, as thereby a much larger amount of sewage would in future have to be pumped at the disposal works. As large a portion of the sewage from the park as possible should be intercepted by the lowest high-level sewer and handled by gravity, in order both to reduce the amount of sewage requiring pumping to a minimum and also to defer as long as possible the construction of the low-level and pumping system.

I am, dear sir, very truly yours

OLIN H. LANDRETH

Consulting engineer

ALBANY, *December* 24, 1903

Mr. CHAS. I. MARVIN, *President Board of Health, Bronxville, N. Y.:*

Dear Sir—I enclose herewith copy of a report made to me by Professor Olin H. Landreth as a result of a recent examination made by him as to the sanitary conditions of the village of Bronxville.

The report of Professor Landreth having received the approval of the department, the attention of the board of health of the village of Bronxville is called to the recommendation contained on page 4 of the report, with the advice that prompt steps may be taken to cause the unsanitary conditions to be abated, particularly those in Lawrence Park.

Very respectfully

DANIEL LEWIS

Commissioner of health

VILLAGE OF WATERVILLE

SCHENECTADY, N. Y., *May* 15, 1903

DR. DANIEL LEWIS, *State Commissioner of Health, Albany, N. Y.:*

Dear Sir—I beg to submit the following report of the examination into the conditions found to exist in the village of Waterville as they relate to sewerage and water supply. My examination was made last fall, and as no steps toward public improvements were contemplated by the village authorities during last season my report has been thus deferred as my time has been needed for other assignments.

The village of Waterville is situated in the northern part of the township of Sangerfield, in the southern part of Oneida county, N. Y., on the Utica division of the Delaware, Lackawanna and Western railroad and about twelve miles southwest from the city of Utica, or twenty-one miles by rail. The village is situated about one mile north of the watershed line between the Hudson river drainage area and the Susquehanna river drainage area, at an elevation of about 1,250 feet above mean tide at New York. Geologically the formations are the Hamilton shales and the Onondaga limestones, the village being situated on the horizon separating these two general formations, and both outcropping in or near the village. The village was incorporated in 1871 and has had the following numbers of population:

In 1890	2,024
In 1898	1,674
In 1900	1,571
In 1902	1,586

This shows a marked decline in population since 1890, but also a slight recovery during the past three years, and the evidences available in the village indicate considerable improvement in the prosperity and numbers at the time of my visit. The village has a public water supply furnished by gravity from a reservoir formed by throwing a dam across the deep valley of a small stream about two miles northeast of the village. The drainage area tributary to this reservoir is only about 2.2 square miles and the supply is therefore deficient or at least hardly adequate. The quality of the water appeared to be very fair, but gave indications of rather more than desirable vegetable growth in the reservoir. Dead leaves from an adjoining forest have also contributed something to the vegetable matter in the water. The reservoir is at a sufficient altitude above the village to furnish a fair working pressure for both domestic service and fire protection.

The village has no sewer system, and were a system to be built the supply of water would certainly be inadequate for the larger use of public water which would be sure to follow both from an increase in the number of consumers and an increased use per capita. This increase in the consumption would of course be attended by an increase in revenue.

The matter of increasing the water supply and of taking in other streams or lakes has received some attention in the village, but no definite surveys or investigations have yet been undertaken for this purpose. There appears to be one or two streams worthy of examination and the question will doubtless resolve itself into one of finance, viz., from which of several available sources can an adequate supply of good water be procured at the least cost per thousand gallons per annum, the annual cost being largely interest on investment.

The chief deficiency and drawback to the prosperity of the village appears to be the absence of a sewer system. The village must depend for any further development and growth on its ability to attract population as a residential center. There are no manufacturing or commercial elements of attraction in the village, but the village does possess decidedly attractive features as a pleasant residence center if the modern improvements can be guaranteed. People at the present time who are looking about either for a place for temporary summer abode or for a place for permanent residence will not stop to consider at all the merits of places which do not offer already the usual modern improvements of transportation, schools, churches, water, sewers, paved or macadamized streets, good sidewalks, etc. All these the village appears to possess except the sewers. The benefits to be derived from modern sewerage systems built on thoroughly up-to-date methods may be classified under the following heads: (1) The ability to use the modern conveniences of bathrooms, water-closets, and efficient drains from kitchen and laundry. The cesspool, while ostensibly permitting these conveniences generally, does so by incurring a danger to the occupants of the house far more to be feared than the privation attending the absence of the conveniences. (2) The prompt removal from the premises of all excremental matter and all organic refuse attendant on the usual domestic operations before decomposition can occur, thus greatly diminishing the chance of infection from specific diseases and still more generally greatly diminishing the harmful influences on the general health of the people arising from the emanations from decomposing matter, which, while not in themselves directly infectious in most cases, still form predisposing elements of harm by sapping the native vitality of individuals and undermining the general resistance to the attack of specific diseases when such occur. It is not generally understood that while most diseases occur in any individual through the direct agency and attack of some specific form of living organism, or so-called germ, and may therefore be said to be infectious in different ways and degrees, still the occurrence of a case of disease does not necessarily follow such infection; in fact, probably a very small proportion of the cases exposed to infection of any disease actually contract the disease, simply because the greater number of such individuals are in such physical condition as to enable them to successfully resist the attack of the organism. The individuals, however, whose power of resistance is low, either from constitutional disorder or, as is more commonly the case, from improper food, impure air, bad surroundings, generally are the ones who, being unable to resist the attack of the organism, succumb to the disease. (3) The general lowering of the plane of ground-water in the soil under cellars and about houses furnishes a condition favorable to good health and high individual resistance. The building of sewers brings about this lowering of ground-water by the natural and unavoidable drainage set up along the trenches and along the pipes even in addition to the amount of water unavoidably entering into the sewer pipes. If the ground is generally wet, it will always be good economy to lay tile drains in the sewer trenches to facilitate this lowering of ground-water.

The public estimation and appreciation of the advantages of sewerage are generally indicated by the fact that the market value of village properties is enhanced by several times the total sewer assessment for those properties. The provisions of the present sewer law for villages by which such sewers may be built either by direct assessment on the property benefited, the assessments being distributed over a number of years, or the building of the system at village expense, to be paid for if desired by issuing thirty-year bonds to be retired gradually after the first five years, makes the total annual cost to any property owner very slight in comparison with the benefits received. Speaking approximately, the cost of a system such as Waterville would probably require would probably average not far from one dollar per running foot of sewer, or fifty cents per linear foot of adjoining property.

Since sewers without an additional water supply seem hardly feasible, it would appear desirable that both questions be taken up together.

Nothing, however, should be done toward actual improvements along either line till after an exhaustive survey and investigation of the most suitable source and kind of water supply, and its cost of operation per annum, and the same for the sewer system. Cheap investigation leads generally to expensive construction and operation and often to unsuitable and inefficient systems when completed.

It would seem proper to recommend, therefore, that the village of Waterville, before taking any steps toward actual improvements, should secure a thorough and complete investigation of both its sewerage and water questions, and preferably also complete plans and specifications for a sewer system and for water works extensions or improvements, with estimates of cost for each separately. The village sewer law requires that such plans for sewers shall be prepared and approved by the State Department of Health before any other steps may be taken. When so prepared the village may proceed as rapidly or as leisurely toward the carrying out of the improvements as it chooses.

Very truly yours
OLIN H. LANDRETH
Consulting engineer

ALBANY, *May* 25, 1903

MR. C. H. CURTIS, *Secretary Board of Health, Waterville, N. Y.*:

Dear Sir—I enclose herewith, for the information of your board as well as that of residents of the village of Waterville, a copy of the report of Professor Landreth based on his examination as to the sanitary needs of the village

I heartily concur with the opinion expressed by Professor Landreth, and feel assured that the authorities of the village of Waterville will take prompt action looking to the eventual improved sanitary condition of the municipality.

Very respectfully
DANIEL LEWIS
Commissioner of health

VILLAGE OF WALTON

SCHENECTADY, N. Y., *December* 19, 1903

DR. DANIEL LEWIS, *State Commissioner of Health, Albany, N. Y.:*

Dear Sir—In the matter of the water supply of the village of Walton, N. Y., I beg to report that agreeable to your instructions I visited Walton on August 19th and 20th and in company with the health officer, Dr. E. D. McKenna, I made an inspection of the water furnished the village and the sources of water supply and found the following circumstances and conditions to exist:

Walton is an incorporated village situated in Delaware county on the west branch of the Delaware river and at the junction of the Delhi division of the New York, Ontario and Western railroad with its main line. The village was first incorporated in 1851. It has a present population of 2,900 people, an increase of about 500 over its population ten years ago.

The village is furnished with water by a private water company called the Walton Water Company, whose officials are, I understand, Hon. A. H. Sewell, president; Mr. Paul Nichol, secretary; Mr. J. R. Hunnel, of Delhi, N. Y., treasurer, and Mr. William Shepard, superintendent. The company was incorporated under the laws of New York between twenty and twenty-five years ago and has a franchise granted by the president and trustees of the village of Walton and the supervisor of the town of Walton under the provisions of chapter 737 of the laws of 1873. The company also has a contract with the village dated August 21, 1879, to furnish water for fire purposes. I beg to enclose copies of this franchise and of this contract as furnished me from the office of the village clerk. The franchise empowers the parties comprising the water company

"To furnish the said village or the inhabitants thereof with pure and wholesome water and for that purpose to lay the water pipes in any or all of the streets or avenues of said village and maintain the same subject only to the provisions of the said statute."

Another water company was organized and was given a franchise to operate in the village a few years ago. This water company was subsequently bought out by the old water company, which now furnishes the only supply of public water in the village.

The Walton Water Company has about 14 miles of street mains besides 10 or 12 miles of street mains which it inherited from the new company. A very large proportion of the total population of the village is connected with either the new or the old company's mains. A portion of the mains of the new company were laid parallel with mains of the old company and some of these are being disconnected and taken up.

The sources of water supply of the Walton Water Company may be described as follows: The Delaware river flows westerly through the village and three streams enter it from the northerly side. These three streams flow approximately parallel and in a southerly direction and enter the river within or near the village limits. The one most easterly is called East creek; next is called West creek and has a tributary called Cars creek; the most westerly of the three streams is called Third brook. West creek is the stream along whose valley the New York, Ontario and Western railroad reaches Walton from the north.

The Walton Water Company has a storage and distributing reservoir on Cars creek just above its junction with West creek. The company also has a storage and distributing reservoir on Third brook at about the same elevation as the Cars creek reservoir. The storage capacity of neither of these reservoirs approaches to the delivering capacity of its respective drainage area. In other words, large amounts of water run to waste during wet seasons at each of these reservoirs. I drove over the drainage areas of both Cars creek and Third brook. The topography of each is that characteristic of Delaware county generally, namely, very hilly, with narrow valleys having steep precipitous sides, well adapted to grazing, but generally too hilly for economical cultivation. The land on both these streams is accordingly chiefly devoted to dairy purposes and large numbers of cattle are maintained on this district. The barnyards and outhouses are generally not far from the main or tributary streams and as a consequence large amounts of polluting matter are washed into the streams both from the pasture lands and from the farm buildings and habitations. A great many sources of pollution were found within dangerous proximity to the adjacent streams; for these reasons the district is an unpromising one for the collection of a suitable supply of surface water for potable purposes. At the reservoirs the appearance of the water fully corroborated the conclusions from the physical examination of the drainage area. The water at each reservoir was seen to be exceedingly rich in organic matter and was teeming with both vegetable and animal life, elements which, in themselves, not harmful, are certain indicators of pollution in the water. While there was a general similarity in the appearance of the water in the two reservoirs, that in the Cars creek reservoir appeared to be a little better than that in the Third brook reservoir, although I was unable to observe any marked difference in the apparent opportunities for pollution on the two drainage areas. An inspection of samples of water drawn from different parts of the village revealed the presence of large amounts of both living and dead organic matter and also mineral sediment. In order, however, to secure more exact information as to the character of the water, I had sterilized flasks sent to the health officer with the request that he furnish a sample of water from each of the reservoirs. This was done and these samples were submitted to Dr. George Blumer, director of the bacteriological laboratory of this department, for bacteriological examination. I enclose herewith Dr. Blumer's report on his examination of these two samples.

From this report it will be seen that while the bacterial content of each sample was too high to indicate a safe water supply for potable purposes, the sample from Third brook reservoir showed the presence of colon bacilli, which is a positive sign of animal pollution and a strong probable sign of sewage pollution.

Dr. Blumer's condemnation of the water would seem to be entirely warranted from his examination and corroborates fully my opinion of the water based on my local examinations. I do not consider either of these reservoirs or these drainage areas to be proper sources of "pure and wholesome water" in their present natural state, and of the two streams the Third brook appears least safe.

Passing to the question of remedial measures, I may say that while the time at my command did not admit of any extended survey or investigation of the extent of the drainage area, it appears probable that a more extended examination would show that the Third brook supply might be abandoned altogether and a sufficient amount of water secured from Cars creek with or without the aid of their adjacent streams by impounding the water at other reservoirs above the level of the distributing reservoir, and that the quality of this water might easily be brought up to the proper standard by filtration.

There can be no doubt as to the general feasibility of both these steps of improvement; the details, however, could only be indicated after a critical investigation and surveys.

The relation between the quality of a village water supply and the health of its inhabitants is so intimate and important that apart from the obligation of the company to furnish pure and wholesome water as provided in the franchise, and as implied independently of any clause stipulating the quality in the franchise, it would seem to be clearly to the interest of the water company to place the quality of its water supply above question without pressure from any direction.

Although none of the officials of the water company except the superintendent could be seen at the time of my inspection, and though I was therefore unable to ascertain what attitude the water company would assume on this question, I think it probable that the officials of the company when presented with an exhibit of the present dangerous character of the source of its water supply would readily and promptly institute the necessary measures for its improvement. I beg therefore to recommend that the dangerous character of the water be stated to the Walton Water Company, with instructions to proceed without delay to make such further needed surveys, examinations and investigations as will enable it to submit plans for the improvement of its water supply in keeping with its needs; and that the necessary improvements be made as soon as the necessary plans can be submitted and approved.

I am, dear sir, very truly yours

OLIN H. LANDRETH
Consulting engineer

[Inclosures.]

An application having been presented to us by Strong Comstalk, N. C. Wood, N. Fitches' Sons, J. H. Townsend, George St. John, L. H. St. John, John Babcock to supply the village of Walton or the inhabitants thereof with pure and wholesome water pursuant to the provisions of chapter 737 of the Laws of 1873 and the acts supplementary thereto, and the said application having been duly considered:

Now, therefore, we, the president and trustees of the village of Walton and the supervisor of the town of Walton, do hereby certify that the said application has been by us granted and we do hereby authorize and empower the said persons to furnish the said village or the inhabitants thereof with pure and wholesome water and for that purpose to lay water pipes in any or all of the streets or avenues of said village and maintain the same subject only to the provisions of the said statute.

(Signed) J. A. WARNER
(Signed) GEO. O. MEAD
Supervisor of Walton, N. Y.

This agreement made and entered into this 21st day of August, 1879, by and between the village of Walton, party of the first part, and the Walton Water Company, party of the second part, witnesseth as follows, viz.:

First. The Walton Water Company shall procure for the village eighteen double discharge Mathews hydrants, and connect seventeen of them with their main pipes, in a suitable and substantial manner at the points heretofore designated by the company's engineer.

Second. The village shall pay for said hydrants, connecting and setting, the actual cost thereof, not exceeding, viz.: 1st, for hydrants set, forty dollars each; 2d, for four-inch connecting pipe, laid and connected, thirty-eight cents per lineal foot; 3d, for special castings, used in connection with hydrants, two and one-half cents per pound. Payment to be made when hydrants are ready for use, the title of all said hydrants, and any that may hereafter be put in, to be and remain in the village.

Third. Should the company in the future desire to extend their pipes beyond the points now contemplated, they shall notify the trustees thereof, who shall determine the number of hydrants to be located on the line of such new pipe, and with the approval of the company's superintendent designate their location. Such hydrants shall be procured, attached, etc., like the original seventeen, the village paying the actual cost thereof when ready for use, the company to determine the hydrant to be used.

Fourth. Said company, its successors or assignees, shall furnish water and the village shall have free use thereof from such hydrants at all times for fire purposes without charge so long as such water works exist.

Fifth. Said company shall take care of and make all necessary repairs to such hydrants and connections at the expense of the village, and have control thereof except for fire purposes, and the village shall not detach the hydrants from the main pipes without the consent of the company.

Nothing in this contract, however, shall be so construed as to render the said party of the second part in any manner liable in damages to said party of the first part for failure to furnish water while making necessary extensions or repairs, or for failure of water from any other cause unless occasioned by the negligence of said company.

It is further agreed that this contract shall bind the parties hereto and the successors and assigns of the respective parties in all its parts.

In witness whereof the said parties have hereunto set their hands and seals (the said party of the second part by its president and secretary as provided by their by-laws) the day and year first above written.

(Signed) J. A. WARNER
President Village of Walton
STRONG COMSTALK
President Walton Water Company
N. C. WOOD
Secretary Walton Water Company

ALBANY, *August* 28, 1903

DANIEL LEWIS, M. D. *Commissioner State Department of Health, City:*

Dear Sir—I beg to report on samples of water submitted by E. D. McKenna, health officer at Walton, N. Y.

Sample from Third brook reservoir. Number of bacteria on agar plates, 2,100 per cubic centimeter of the water. Gelatin plates liquefied. The fermentation test showed the presence of the colon bacillus in the proportion of one organism to each four cubic centimeters of the water.

Sample from Carr's creek reservoir. Number of bacteria per cubic centimeter as shown by colonies on agar plates, 1,200. The fermentation test shows gas production in all of the tubes inoculated, but not of the character peculiar to the colon bacillus. The gelatin plates were liquefied.

The sample from Third brook reservoir is not a suitable water for drinking purposes, as is shown by the presence of the colon bacillus, indicating organic contamination from sewage. It is therefore condemned. The water from Carr's creek reservoir does not show in this sample definite evidences of organic contamination. It contains gas producing and gelatin liquefying organisms, but these facts are not considered sufficient evidence for condemning the water.

Respectfully submitted.

GEO. BLUMER

ALBANY, *December* 23, 1903

Mr. A. H. SEWELL, *President Walton Water Co., Walton, N. Y.:*

Dear Sir—I enclose herewith for your information copy of a report made by Professor Olin H. Landreth upon his investigation of the public water supply of the village of Walton as furnished by the Walton Water Company.

It will be seen from the report made to me by Professor Landreth that the water furnished is not considered of a quality suitable for drinking purposes, particularly the supply distributed from "Third brook reservoir."

It is therefore advised that the Walton Water Company proceed without delay to make the surveys, examinations and investigations necessary to enable it to formulate plans for the improvement of its water supply, such plans to be submitted to this department for approval.

Very respectfully
DANIEL LEWIS
Commissioner of health

GENEVA WATER SUPPLY

WAVERLY, N. Y., *March* 31, 1903

DANIEL LEWIS, M. D., *Commissioner of Health, Albany, N. Y.:*

Dear Sir—Your favor of the 27th instant at hand with directions to visit Geneva and inspect local water supply.

March 27th, visited Geneva. Called upon H. O. McCarthy; with him, Dr. Calude Lyttle, James Dirkin, members of the board of health, and for a brief time the president of the board. William O'Brien, visited the water supply of the city.

The waters for potable and other purposes have two sources. The chief source from Seneca Lake, about two miles up the lake in a southerly direction. The lake is a body of fresh water having its source at Watkins and outlet in Seneca river at Geneva, estimated in length 38 miles, with an average width of about one and a half, fed chiefly by springs and brooklets along its course. Years ago before the present Worthington system by pumping was adopted, the water was furnished from what is known as White Springs, conducted in reservoirs on the heights above the present city, 180 feet above the lake level, furnished consumers by gravity. The water main from the reservoirs is now connected with a water main from a pumping station, which station is located about one mile distant up the lake from the city limits on the west shore.

The intake is 600 feet in the lake from the shore line at a depth of 35 feet from the surface of the water. The daily consumption is estimated at one million gallons. Below this point in a northerly direction on high ground the city is located, and the sewage from it enters the lake. The nearest point a sanitary sewer enters the lake below the intake is about one mile, and farther still below this point, estimated at two miles, the main sewer enters, at no less a distance from the shore line than fifty to sixty feet.

It is stated there are about 150 individual sewers entering the lake in the rear of residences situated on the east side of Main street between the points of sewer entrance above mentioned. The pumping station is generally worked from 8 a. m. until 5 p. m. It will be observed but little water is furnished from the White Springs reservoirs, except after the pumps cease operating. The shore of the lake in the vicinity of the pumping station is clean, the water clear, of a blue color, and very cold. It is said the lake very seldom freezes, and only in certain localities.

The surroundings about the reservoirs are clean and neat. The water clear, cold and of a bluish color; in a word, the sanitary conditions good.

It is thought if any pollution exists in the lake water it comes from Willard Asylum located thirteen miles distant up the lake on the east side or opposite shore. H. O. McCarthy states, no infectious or contagious diseases exist in the city with the exception of measles. The city health record good. It is stated, the object of this inspection is more on account of precautionary measures and to satisfy the public mind concerning the water supply because of the Ithaca epidemic of typhoid fever.

I suggested in addition a bacteriological examination of the water from Seneca lake to be taken at the intake for this purpose.

Very respectfully yours
WM. E. JOHNSON
Secretary State Department of Health

SEWAGE POLLUTION OF NEW YORK BAY

SCHENECTADY, N. Y., *February* 6, 1903

Dr. DANIEL LEWIS, *State Commissioner of Health:*

Dear Sir—In reply to your inquiry the other evening as to the probable effect of the discharge of the sewage from the proposed Passaic Valley trunk sewer on sanitary conditions in New York, I regret that I am not sufficiently familiar with just what is proposed to form an opinion. It would seem, however, that there were one or two points which would warrant an inquiry on the part of either or both the state and city of New York into the probable results to be expected and the most feasible manner of preventing or correcting undesirable conditions should any be likely to follow the carrying out of the enterprise.

I do not see that the right of several municipalities to unite and discharge their sewage into a stream to which some of them are not tributary can be considered as closed or unquestioned if thereby harmful results are to follow. Existing cases of the discharge from large cities like New York would not appear proper precedents, since the art of sewage disposal even for large cities has made great advances since those installations were effected, and a warrantable act then would not of necessity appear to be so now. The city of Boston has spent immense sums of money in order to avoid doing what appears to be proposed here. Possibly the Moon Island (Boston harbor) plan of tidal basins discharging only on ebb tide may be worth considering here.

I am, dear sir, very truly yours

OLIN H. LANDRETH

ALBANY, *March* 4, 1903

Hon. BENJAMIN B. ODELL, *Governor of the State of New York:*

Dear Sir—It is a matter of common knowledge that the construction of an immense trunk sewer which is to take the sewage from a large section of the state of New Jersey and discharge it into the waters of this state is now being considered by the legislature of New Jersey.

Unless some provision is made for the discharge of such a large body of sewage at flood tide, or unless some method of treating the sewage is adopted before it is discharged into the waters of the bay, the shores of Staten Island and for long distances beyond Staten Island will likely be covered with deposits from this source which would be a possible menace to the public health.

It is respectfully suggested that some conference between the authorities of this state and the state of New Jersey might be arranged whereby the deleterious effects of this proposed discharge of sewage may be counteracted or prevented.

This communication is made to you for such action as in your judgment may be wise under the circumstances above stated.

Very respectfully

DANIEL LEWIS

Commissioner of Health

Under chapter 539 of the Laws of 1903, commission appointed to investigate certain threatened pollution of the waters of New York bay.

LAKE PLACID

SCHENECTADY, N. Y., *December* 30, 1902

DR. DANIEL LEWIS, *State Commissioner of Health, Albany, N. Y.:*

Dear Sir—In the matter of the pollution of the Ausable river and its potability for public water supply by the discharge of sewage into Chubb's river, a branch of the Ausable, from the village of Lake Placid, I beg to report that on the occasion of a visit to Lake Placid during the past fall I took occasion to verify the matter of the discharge of sewage into the stream mentioned and to gather some facts concerning the character and extent of the pollution.

The result of my investigation indicates that the supposition as to the source of the sewage pollution developed in the Wilmington examination is fully verified, as is shown by the following facts:

Lake Placid is a scattering village incorporated in 1900 under the General Village Law. It is a popular Adirondack summer resort and has a summer population of from 3,000 to 4,000 people, with less than half that number as a permanent population. There are two private water companies, both of which take water from the outlet of Lake Placid. There is a sewer system built before the incorporation of the village. This system is used by from one-third to one-half the population, including the majority of the hotels. The hotels connected with the sewer system are as follows: The Stevens, The Grand View, The Placid House, The Lake Side Inn, The Homestead, The Placid Club, The North Wood Inn, besides several smaller hotels. The system discharges directly into Chubb's river without any system of treatment or disposal whatever. The distance from the point of discharge to the village of Wilmington is about thirteen miles as measured along the river, a distance very much too short to insure such an amount of purification of the waters of the stream as would render the water safe to use for potable purposes. Neither is the size of the stream large enough to secure this safety by dilution. The drainage area appears to be about 125 square miles at Wilmington, and we may reasonably expect a dry weather flow of not more than 30 cubic feet per second from this area, an amount too small to secure by dilution the needed safety for potable purposes. From these facts I am convinced that the discharge of sewage from this village constitutes a real danger to the people who use the water at Wilmington. From the reasons mentioned in my report on the case of Wilmington, it would appear eminently proper and a duty for the State Department of Health to exercise its authority to protect the lives and health of persons using this river water by requiring that the waters be kept from sewage pollution.

Very truly yours
OLIN H. LANDRETH
Consulting engineer

ALBANY, *January* 27, 1903

MR. CHARLES N. DAVIS, *President Board of Health, Lake Placid, N. Y.:*

Dear Sir—Complaint having been made to this department concerning the alleged pollution of the waters of Ausable river by reason of the discharge of sewage into the Chubb's river, a branch of the Ausable, Professor Olin H. Landreth was directed to make an investigation concerning same.

A copy of Professor Landreth's report is herewith enclosed, from which it will be seen that the complaint is well founded, and that it is the duty of the board of health of the village of Lake Placid to take proper steps looking to the prevention from further pollution of the potable waters of Ausable river and its branch, Chubb's river.

It is advised that your board promptly notify the proper village authorities of the nuisances referred to in the report, with instructions to cause the abatement of same at the earliest practicable time.

Kindly advise this department of such action as may be taken in the matter.

Very respectfully
DANIEL LEWIS
Commissioner of health

LAKE PLACID, N. Y., *February* 5, 1903

DANIEL LEWIS, M. D., *Commissioner of Health, Albany, N. Y.*:

Dear Sir—In reply to your letter, with enclosure, relating to the pollution of Ausable river waters by the sewage of this village, I have to state that the health board of Lake Placid village submitted to the board of trustees the following:

The health board of Lake Placid village, N. Y., have been advised by the State Department of Health that a nuisance exists in the sewage of Lake Placid village into Chubb river, a tributary of the Ausable, whereby the potable waters of the same are dangerous to the health of persons using the water for potable purposes; also to notify the village board of trustees to abate the nuisance at the earliest practicable time.

Dated February 2, 1903, and signed by C. N. Davis, president, C. W. Kennedy, F. G. Walton, members of the health board.

Yours respectfully

CITY OF FULTON

ALBANY, *January* 15, 1904

Hon. DANIEL LEWIS, *Commissioner of Health, Albany, N. Y.*:

Dear Sir—Referring further to your letter of the 21st ultimo bearing on the subject of the complaint of the health officers of the city of Fulton, I have to say that I have caused an investigation to be made of the complaint made by Health Officer Daniel E. Lake, and send you herewith two copies of the report made after such investigation, one for your own use, and one which, if you desire, may be transmitted to the health authorities at Fulton.

You will note that the inspector discovered that the greatest nuisance which exists is one which results from the maintaining by the water works officials of water-closets on the upper and lower floors of houses occupied by families connected with the work; that the refuse discharged was dumped directly into the open ditch; that the water used in the pumping station after condensation is also discharged from the same pipe into the creek, but that this does not carry away the extra excremental matter deposited as above referred to.

Steps will be taken by the department when conditions are favorable to put the ditch in condition so that there may be a free flow of water; nevertheless the ditch was never intended to carry off sewage, and I shall be glad to have you direct the local health authorities to make some other provision for the discharge and care of sewage at the pumping station. Such steps, in my mind, will certainly do away with the only suspicious source of contamination of the water supply.

I send you herewith blue-print maps of the location, etc.

Yours very truly
CHAS. S. BOYD
Superintendent of public works

[Enclosures.]

ROCHESTER, N. Y., *January* 9, 1904

HON. CHARLES S. BOYD, *Superintendent Public Works, Albany, N. Y.:*

Dear Sir—I herein report relative to the above subject, the premises having been carefully examined by me in company with David S. Burleigh, superintendent of section No. 2 of the Oswego canal. Reference is made to the accompanying blue-print map, showing the location of the ditch and pumphouse in question, which was furnished me by W. H. H. Gere, division engineer of the middle division.

The waterworks plant of the city of Fulton was built in 1885 by the Fulton Water Company, a private corporation, and sold to the city of Fulton in 1900. The Oswego river flows northerly through the said city, and along the territory in question and at many other points it is canalized and the east shore line has been straightened somewhat for that purpose. The present embankment along the east side of this portion of the river is an earthen dyke built high enough to keep the water in the river within bounds during flood periods and the top of it has been graded off and is used as a towpath.

The pumping station is located about 300 feet east of the towpath and between it and the highway and about 5,600 feet south of guard lock No. 3, located in the southern part of the city. South of and near the pumping station is located a circular cistern 20 feet in diameter, 25 feet in depth, below the surface of the ground and ordinarily containing 20 feet depth of water. About 600 feet farther south is located another circular cistern, being 20 feet in diameter, 16 feet in depth below the surface of the ground, and ordinarily containing 10 feet depth of water. Four thousand feet farther south is located another circular cistern 20 feet in diameter, 12 feet in depth below the surface of the ground, and ordinarily containing 9 feet depth of water. Two hundred feet still farther south is located another circular cistern, being 15 feet in diameter, 12 feet in depth below the surface of the ground, and generally containing 8 feet depth of water. The two last mentioned cisterns are located on the east side of the highway, paralleling the east side of the river, and are not shown on the accompanying map. The aforesaid cisterns are connected with each other by a line of vitrified pipe of 12-inch internal diameter, the joints of which are filled with cement, and the water is brought by gravity through said vitrified pipe to cistern nearest the pumping station.

Ordinarily the water is pumped from this cistern up into a standpipe located on the east side of the highway and from which it is delivered by gravity throughout the water pipes of the city, but in case of a fire the standpipe is cut out and the water is pumped from the cistern directly into the water mains.

I did not meet Daniel E. Lake, the health officer, as he was absent from his office, but did meet his son, Dr. Lake, who is associated with him, who informed me that he was entirely conversant with the subject of the complaint in question, and who stated that the source of two cases of typhoid fever in Fulton had been traced to wells, the use of which had been ordered discontinued; that the source of a few cases could not be traced; that no case had been traced to the pollution of the municipal water supply, and that the complaint in question was made as a precautionary measure rather than with the idea that any pollution whatever of the water supply had actually taken place.

The open ditch in question is located in the rear of the towpath and extends from a point about 1,100 feet south of the pumping station to a point about 3,900 feet north thereof, except that two lines of 24-inch vitrified pipe have been laid in the line of the ditch and covered over for a distance of 76 linear feet opposite the pumping station to admit of docking purposes or unloading coal and otherwise. Said ditch is shown on the accompanying map as extending from station No. 426 to station No. 476, a distance of 5,000 linear feet, where it connects with a 24-inch vitrified pipe through which the water passes to and under the canal and is eventually discharged into the Oswego river at a point below the pulp mill, between State street and Broadway.

Said ditch has a bottom width of from 3 to 5 feet and is filled with grass and flags (cat-tails) for nearly its entire length. Water stood in the 24-inch vitrified pipes heretofore mentioned opposite the pump house to a depth of 12 inches and no current was observed at that point or elsewhere along the ditch. At the north end of the open ditch where it connects with the 24-inch vitrified pipe the grade of the bottom of the pipe is lower than that of the bottom of the ditch, the water flowing through the ditch passing

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over a breast wall and falling into a chamber, thence into the 24-inch pipe. The top of the breast wall is higher than the bottom of the ditch and is responsible to some extent for the standing water in the ditch. The grate at the head of the 24-inch pipe gets clogged at times and also hinders in some degree the free passage of the water.

This ditch was cleaned out under the supervision of Section Superintendent David S. Burleigh two years ago last fall at a cost of about $75, the cleaning consisting of pulling out the weeds and flags with hooks; no particular amount of excavation by the use of shovels having been made. There is an apparent reason why the ditch should be maintained by the state, although the existing conditions are aggravated by the action of the city authorities of Fulton.

Previous to the $9,000,000 work done in that locality, the towpath existed on its present route, and sluices or openings existed through the towpath at various points. During flood periods in the Oswego river the water therefrom passed out of the river through said sluices and inundated all of the lowlying lands adjacent to the rear of the towpath and caused much damage in many cases. During the ebb-flow of the river said sluices admitted of the flood waters passing from the private lands through them into the river and at all times admitted of the free disposal of the surface water produced from ordinary rainfall.

Under the $9,000,000 work the crest of the Oswego Falls dam was raised two feet, which necessitated the raising of the towpath that amount. During the progress of the work the then existing sluices along the locality in question were closed up. This in itself was of great benefit to the adjacent low lands, as it prevented their being flooded by the Oswego river and allowed a much greater area to be cultivated without fear of damage to crops from floods, and also made it safe to erect buildings on this area. The closing of the sluices, however, necessitated the construction of the ditch in question for the disposal of the surface water naturally obtaining throughout the low ground, and it may be that the state is in duty bound to keep it in a fairly clean condition for that purpose.

My examination of the premises also developed the following facts: The waterworks officials maintain in the pumping station two water-closets—one on the upper floor, which is occupied by a family, and one on the lower floor—each of which delivers its contents directly into a 10-inch vitrified pipe leading from the pumping station to the aforesaid ditch at the north end of the double line of 24-inch pipe, heretofore mentioned opposite said station, where said contents are discharged directly into the open ditch. The water used in the pumping station, after condensation, is also discharged through the same pipe into the creek, but fails to carry away the excremental matter and the closet paper used, which are collected in the weeds and flags.

I believe that the normal condition of the ditch—that is, with unpolluted surface water in it—is not detrimental to the water supply of the city, but for the purpose of allaying any undue excitement of the residents of Fulton and carrying out any implied duty of the state, I recommend that at a convenient season (perhaps in April or May next or at any time when the weather is suitable for it) said ditch be cleaned out; the breast-wall at the north of the ditch being lowered sufficient to allow any water in the ditch to pass over it. It is possible that the continued discharge of sewage into the ditch at a point so near the cistern at the pumping station may pollute the water to some extent, and I therefore recommend that the State Board of Health be requested to cause said discharge of sewage from the pumping station into the ditch to be abandoned, which event will undoubtedly destroy the real and only suspicious source of contamination of the water supply.

Respectfully yours

OSCAR H. PEACOCK
Inspector

ALBANY, *January* 18, 1904

DANIEL E. LAKE, M. D., *Health Officer, Fulton, N. Y.:*

Dear Sir—I enclose herewith, for the information of the board of health of Fulton, copy of a report made by Oscar H. Peacock, covering his investigation of your complaint concerning the alleged pollution of the public water supply of the city of Fulton.

The Commissioner of Public Works in submitting this report makes the following comment:

"You will note that the inspector discovered that the greatest nuisance which exists is one which results from the maintaining by the waterworks officials of water-closets on the upper and lower floors of houses occupied by families connected with the works; that the refuse discharged was dumped directly into the open ditch. Steps will be taken by the department when the conditions are favorable to put the ditch in condition so that there may be a free flow of water; nevertheless the ditch was never intended to carry off sewage, and I shall be glad to have you direct the local health authorities to make some other provision for the discharge and care of sewage at the pumping station."

In view of the report received from the State Department of Public Works, it is recommended that the board of health of the city of Fulton take immediate steps to require the water commissioners to sanitarily care for the sewage which it is claimed is now being discharged into the ditch of which you complain.

Keep this department advised of such action as may be taken by your board.

Very respectfully

DANIEL LEWIS
Commissioner of health

CITY OF ELMIRA

Typhoid fever

ALBANY, *August* 25, 1903

DANIEL LEWIS, M. D., *Commissioner, State Department of Health,*
Albany, N. Y.:

Dear Sir—I beg to report upon the investigation of the recent epidemic of typhoid fever in city of Elmira, made by me on August 19th, as follows:

The facts as given by the health officer, Dr. H. D. Wey, are these:

On July 7th cases of this disease began to be reported until on the day of the investigation they numbered thirty-four (34). Of these, twelve had occurred in July and twenty-two in August. Of the cases nineteen were males and fifteen were females. One was a colored person. The ages of the cases were as follows: Five to ten years, 9; ten to twenty, 14; twenty to thirty, 5; thirty to forty, 3; and from forty to fifty, 3. The cases occurred in all parts of the city, the largest number in any one ward being ten reported from the fifth ward. The cases did not occur among the patrons of any small number of milk dealers, and therefore the probability of the epidemic being due to an infected milk supply can be ruled out. Owing to the wide distribution of the cases and their almost simultaneous appearance, the transmission of the disease by the means of flies can also be ruled out of consideration.

The following points concerning the relation of the cases to the two sources of water supply in Elmira have been made out. The supply furnished the city as a whole is taken from the Chemung river, pumped a mile or more to a filtration plant, of the mechanical type, and after filtration a portion of the water is sent into the city mains directly, while the remainder is pumped into a reservoir which supplies the higher parts of the city. A certain amount of water is also obtained from a reservoir located in the hills whose source of supply is the surrounding rural country. This water is filtered through the same filters as the river water and is distributed in the same manner. It is, however, difficult to run this water through the filters rapidly and for this reason the water from this source is not often used.

The other source of supply is from a large number of wells, both public and private ones, and chiefly "driven" in construction.

On June 25th the river rose six and a half feet owing to a heavy storm. The river also rose eight and a half feet on July 6th from a similar cause. The source of water supply of the cases reported in July is given by Dr. Wey as follows: City's supply, 10; wells, 1; well and city, 1. In August the sources were these: City's supply, 11; wells, 10; well and city, 1. In that part of the city south of the river the distribution was as follows: City's supply, 2 cases; wells, 1 case. Summarizing these figures, we find that 21 cases commonly used city water and 11 well water, while 2 used both.

In addition to the above facts the records of the department show that there were 10 cases of typhoid fever in the village of Elmira Heights in July and I learned in Elmira that the number of cases in that village was then placed at 17. The village water supply is identical with that of Elmira. Many private wells are in use, however.

Taking the above facts into consideration, a very natural, proper, and strong suspicion must rest upon both city and well waters as the sources of the disease both in Elmira and in Elmira Heights. As it would be rather difficult to suppose that two dozen or more wells scattered over such a large area as comprises these two localities would become contaminated with typhoid bacilli at the same time, the burden of suspicion naturally falls upon the city supply.

In all seven samples of water were taken on the day of the investigation, August 19th. Four of these were from the city's system and three from wells. Gelatine plates of the samples from the city supply were made in Elmira about three hours after their collection, and all the samples were brought to Albany and placed on ice at 11 p. m. and a complete series of gelatine plates and tests for the presence of the colon bacillus were made the following morning.

As the counts of the plates made in Elmira did not differ materially from the counts of the plates made in Albany an average of both series will be taken.

Sample No. 1. Water from the well of the river pumping station shows an average of 7,400 bacteria per cubic centimeter of water. The fermentation tube test showed the presence of at least one colon bacillus to each cubic centimeter of the sample. The presence of the streptococcus of sewage (Houston) was also demonstrated.

Sample No. 2. Water from a tap on the grounds of the filtration plant, said to come from the main bringing the river water to the filtration plant, shows an average of 30,000 bacteria per cubic centimeter of water. The tests for the colon bacillus gave the same results as for sample number one.

Sample No. 3. Water from the flume directly after filtration shows an average of 1,700 bacteria per cubic centimeter. The fermentation test failed to show the presence of the colon bacillus in ten cubic centimeters of the sample. The carbolized broth method, however, showed the water to contain at least one colon bacillus per one hundred cubic centimeters of the sample.

Sample No. 4. Water from the city supply in the house of Dr. Wey shows average of 930 bacteria per cubic centimeter. The fermentation test showed the presence of one colon bacillus in thirty cubic centimeters of the sample. The carbolized broth method also showed at least one organism to each hundred cubic centimeters of the water.

Sample No. 5. Water from a pump in Grove Park shows an average of 55 bacteria per cubic centimeter. The fermentation test failed to show the colon bacillus in ten cubic centimeters or less of the sample, but the carbolized broth method showed it to be present in the proportion of at least one organism to each sixty cubic centimeters of the sample.

Sample No. 6. Water from a pump on Church street (pipe from a driven well coming to the surface in the street gutter) shows an average of 515 bacteria per cubic centimeter of the sample. The fermentation test showed the colon bacillus in a proportion of at least one bacillus to each 10 cubic centimeters of the sample, which was confirmed for each 60 cubic centimeters by the carbolized broth method.

Sample No. 7. Water from a pump in the house No. 163 Harriet street shows an average of 1,400 bacteria per cubic centimeter. The fermentation test failed to show the presence of the colon bacillus per 10 cubic centimeters of the sample, as did also the carbolized broth method for 60 cubic centimeters.

Of the well waters examined one (number six) is polluted and should not be used for drinking purposes. The water from well number seven should be reexamined, as its surroundings and high bacterial count are suspicious.

The result of the examination of the Grove Park water makes it very unlikely that this water played any part in the causation of this epidemic as was supposed by some persons.

The result of the examination of the river water before and after filtration shows the removal of about 95 per cent of the bacteria present in the raw water, by the filter plant, upon the day the samples were taken. This single examination does not of course give any indication of the average percentage efficiency of the plant, inasmuch as the system is composed of eighteen filter units each of which may be cleaned as often as three or four times a day, with a consequent alteration of the efficiency with each change.

An examination of the records of the company, giving the results of tests made from time to time, showed that the average percentage efficiency would run higher than the results obtained by me, but on the other hand the efficiency has, in some instances, been 1 per cent lower.

The results of this investigation would seem to warrant the drawing of the following conclusions:

The burden of suspicion rests on the city water supply as the probable cause of the epidemic of typhoid fever.

At least some of the wells located in the city contaminated water and a systematic examination of all of them should be undertaken and all those found to be polluted should be closed up.

The bacterial efficiency of the filtration plant is subject to a certain amount of variation, which, considering the badly polluted character of the river water, is a matter of serious concern. Its prevention would undoubtedly be easier if a constant supervision of the plant, by a well-trained water bacteriologist and chemist, was inaugurated instead of the present plan of such a supervision at irregular intervals.

Yours very truly
HERBERT D. PEASE
Director antitoxin laboratory

ONONDAGA COUNTY PENITENTIARY

Typhoid fever

WAVERLY, N. Y., *November* 2, 1903

DANIEL LEWIS, M. D., *Commissioner of Health, Albany, N. Y.:*

Dear Sir—At the request of Dr. F. C. Curtis, per telegram of the 30th instant, to investigate source of infection of water supply of Onondaga County Penitentiary, of Jamesville, N. Y., by reason of typhoid fever, I beg to submit the following report, to wit:

Friday, October 30th, proceeded to Jamesville. October 31st, telegraphed health officer, Dr. Marsh, of Syracuse, of my arrival. He telephoned me of his inability to be present. With John S.

Markell, superintendent, visited the source of the water supply for penitentiary from a spring issuing from the rock at the base of the foot hills, impounded by a stone wall and covered, constituting a small reservoir 10 by 12 at an elevation of about 5 or 6 feet above the bed of Butternut creek and about 100 feet distant therefrom.

The water from the reservoir is forced by pumps to the top of the penitentiary building standing on an elevation 180 feet to the top of the hill range ascending abruptly 1,500 feet distant. The inmates of the penitentiary, including retainers, number about 200. Within 20 feet south of the spring reservoir is the county line, and abutting it stands an old barn of small dimensions with an old privy vault at the rear and side 33 feet from the spring, which has been in use for 60 years past, all of which is on the line of the spring on a little higher ground. The privy vault is now being demolished and the débris removed by Superintendent Markell, with a view of placing the whole premises in a good sanitary condition. It may here be stated for some three or four hundred feet distant up the valley in a southerly direction issue from the rocks several springs on about the same line from which families take water, and recently some members of whom suffered from typhoid fever prior to the cases now existing in the penitentiary hospital.

The ground surface all along in this vicinity appears saturated with offensive material, but more especially about the penitentiary spring reservoir, where stands the above mentioned old barn and privy.

As a matter of coincidence, brought to the attention of Superintendent Markell by this investigation while viewing the premises at the spring, attention was called to the cases of typhoid fever at Thomas Eaton's at Onatavia, visited by me recently in the town of La Fayette, seven miles distant south, residing on the same line of hills with drainage toward Butternut creek, the same which courses through the valley, through Jamesville northerly, to Chittenango creek.

It appears in July last the water in the spring reservoir became low. It was thought to be occasioned by a leak in the bottom. The pipes seemed to take in air by the pounding noise made through the penitentiary building. Upon investigation at the spring by excavating a few feet westerly toward the bank of the creek, and before completion, it was thought the leak was corrected, in view of the water in the reservoir rising to its normal level and the cessation of the pounding in the pipes. It is now intimated the supposed leak may not have been the correct solution of the difficulty. About one mile distant above on the stream is located the State reservoir dam for impounding the waters of Butternut creek for feeding the Erie canal in case of emergency. For the past two months or more the gates had been opened for the above purpose by reason of a break in the 60-mile level of the canal, taking all the impounded water in the reservoir, causing the large uncovered area of débris exposed, and it is now recalled during the period of excavation at the spring to correct the leak the gates were closed at the gate house dam, causing the waters to rise therein 25 or 30 feet.

It is suggested, by reason of the rocky seams lining the base of the cliff all the way from spring to dam may account for the rise of water in the penitentiary spring reservoir. No cases of typhoid fever are known to have existed upon the stream entering the state reservoir except the family of Thomas Eaton, whose residence is about half a mile from the creek with a rapid descent toward it, the drainage from his premises or farm being in that direction.

The penitentiary buildings are constructed of stone; only two years since their completion and occupancy. In all the apartments care was taken with respect to good ventilation and light. Each cell provided with a flush closet and water tap in good sanitary condition. The building is provided with a sewer system and disposal works; also, a small incineration plant for burning sweepings, garbage, and other refuse. The grounds well kept, presenting an inviting appearance. The hospital, located in the upper story of the building, well appointed for the care of the sick and provided with modern accessories for comfort and convenience, in a good sanitary condition.

With Dr. Lewis Wheeler, prison physician, visited five cases in prison hospital suffering from typhoid fever.

It may be stated that cases were all taken ill about the same time in their cells, characterized by insiduous prodromes of ten days to two weeks duration. None less than a month in prison, and not known to have been exposed to infection.

Case No. 1. Male, age about 35, admitted to prison October 1st, admitted to hospital October 28th, with temperature 104, a. m.; October 31st, temperature 106, p. m.

Case No. 2. Male, age 38, admitted to prison July 6th; admitted to hospital October 24th; temperature 103, a. m.; October 31st, p. m., temperature 105.

Case No. 3. Male, age 21, admitted to prison May 15th; admitted to hospital October 28th; temperature 103, a. m. October 31st, temperature 105, p. m.

Case No. 4. Male, age about 30, admitted to prison July 20th; admitted to hospital October 29th; temperature 103.5, a. m.; October 31st, temperature 104, p. m.

Case No. 5. Male, age 49, admitted to prison September 2d; admitted to hospital October 29th; temperature 102.5, a. m.; October 31st, temperature 104, p. m.

The milk supply from county farm, but none supplied the convicts previous to their illness. All fabrics used by the sick are placed in a solution 1:20 carbolic acid, boiled and washed. Articles of bedding soiled by involuntary discharges are burned. Stools treated in receptacles with Hg. Bi Chlorid solution 1:4000 and chlorinated lime allowed to remain 20 minutes or more, placed in buckets made of iron with covers, and taken 600 feet to a trench dug 3 feet and covered. All articles known to have come in contact with the patient rendered antiseptic. The bedding in cells burned, cell walls and closets washed with an antiseptic solution. The water used for bathing, drinking, and culinary purposes boiled by order of the superintendent upon the recommendation of the prison physician.

Samples of water as per list taken October 30th, by Dr. May, of Syracuse, city bacteriologist (report furnished state department of health November 1st):

SAMPLES OF WATER

1. Penitentiary reservoir.
2. Puffett's spring near barn.
3. Puffett's spring in cellar.
4. Alvord's spring.
5. Moxon's faucet over sink.
6. At entrance to tank in attic.
7. Cell 4S. Jail. Wright.
8. Bakery faucet.
9. Cell 9G, west wing.
10. Faucet over washbowl. J. S. M. Bathroom.

It is stated but one case of typhoid fever has been known in the penitentiary previous. A colored man was admitted to prison December 29, 1902, from Norwich, Chenango county. January 3, 1903, prescribed for in cell. January 13th, admitted in hospital. January 18th, died.

At the request of Superintendent Markell, Dr. James H. Paul, local physician of Jamesville, was interviewed. He states he has had the professional care of all the cases of typhoid fever recently in Jamesville. Has been a resident of Jamesville for the past five years.

Case No. 1. Female, age 30, married. Resides on the east bank of Butternut creek opposite a spring issuing from the cliff rock about 500 feet south of the penitentiary spring reservoir. Taken ill about September 1st last. Ill about five weeks, sanitary condition bad, recovery complete.

Case No. 2. Male child, age 10, resides about 150 feet from bank of creek, and possibly 100 feet from penitentiary reservoir. Water supply taken from spring in cellar on line with penitentiary spring reservoir. It is upon this property the old barn and privy stands. Taken ill about September 25th. Now convalescent, sanitary conditions bad.

Case No. 3. Male child, age 15, resides on penitentiary hill grounds, son of one of the keepers in the institution. Water supply from penitentiary reservoir spring. Taken ill October 24th, doing as well as could be expected October 31st.

Dr. Paul further states Jamesville is a town municipality of about 300, without a sewer system. The surface drainage enters Butternut creek.

Every year for the past five years he has treated from two to eight cases of typhoid fever in the village and vicinity. The cases about equally distributed between village and country, many cases among school children.

Dr. Lewis Williams, prison physician, is a resident of Pompey Hill, 7 miles southeast from Jamesville. He reports six cases typhoid fever there, which is in the vicinity of the farm of Thomas Eaton, before mentioned. Five miles farther east in Delphi valley are ten cases. East Syracuse, 6 miles north of Jamesville, five cases. Fabius, 12 miles southeast of Jamesville, typhoid fever existing as an epidemic. See map.

It will be observed the cases in Jamesville under the care of Dr. Paul reside in the vicinity of the penitentiary reservoir, and obtain their water supply from springs on the same line. The report of water examination clearly proves the contamination of the penitentiary water supply and undoubtedly the pollution of said water in part, if not wholly, from the old barn and privy vault on Puffet's property. Farther above, Alvord spring, where typhoid fever existed, and Puffetts spring in the cellar, where a case is now convalescing. There yet remains a question concerning the state dam reservoir. When full of water, may not this have caused the water in the reservoir spring to have risen, and if so, it would indicate the east bank at the foot of cliffs largely composed of seam rocks to percolate down the stream about one mile, furnishing the water to the springs below in the locality before mentioned. I would suggest that the state dam water be examined. It has occurred to my mind since receiving yesterday the report of the water examination "polluted from fecal matter from all sources obtained," how contamination could exist in the springs above the penitentiary reservoir, 400 feet or more distant above the old barn and privy vault. I recall the line of sewers from the penitentiary to the base of the hills which I understood the fluid portion of the sewage in the disposal works to flow down the hill through drain pipes, losing itself in the soil. It was said the ground did not take care of it satisfactorily, and it became necessary to change it by other drains which at this time is not clear to my mind. Taking the theory that the water from the state reservoir may percolate through the rocky seams at the base of the hill, may it not be possible it may carry in its course some portion of the liquid sewage with which the soil may be saturated to the springs below.

Beg pardon entering into the subject beyond the requirements, the investigation having proved interesting my only excuse.

Sincerely yours
WM. E. JOHNSON
Secretary state department of health

SYRACUSE, *November* 5, 1903

Dear Doctor JOHNSON:

As per request, I submit report of findings in cultures from water supply at Onondaga county penitentiary at Jamesville, N. Y.

Took samples of water from ten different sources.

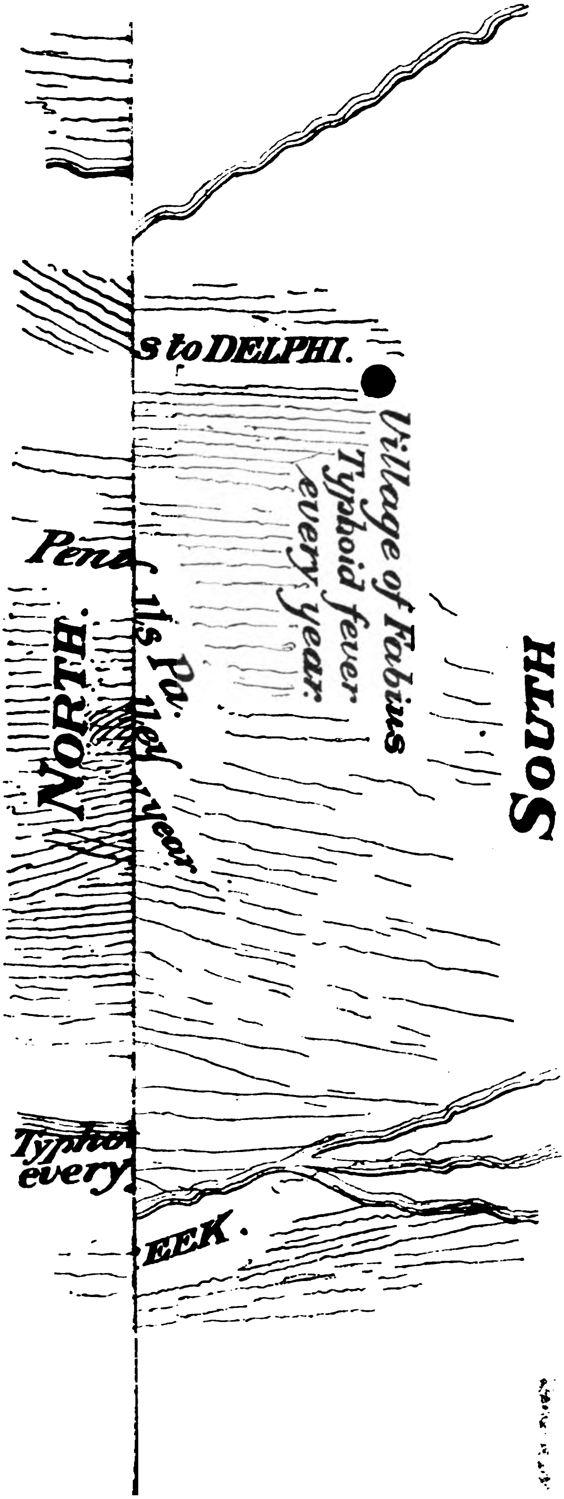
No. 1. Main reservoir supply of Onondaga penitentiary; colon bacilli, 2,500 to each cubic centimeter.

No. 2. Spring 6 feet south of M. residence; 2,200 colon bacilli per cubic centimeter.

No. 3. Spring in cellar of Puffet house; about 800 colon bacilli per cubic centimeter.

No. 4. Alvord spring at roadside; about 600 colon bacilli per cubic centimeter.

No. 5. Tap in house of keeper near Onondaga penitentiary (child sick with typhoid fever); colon bacilli in large numbers.


s to DELPHI.
Village of Fabius
Typhoid fever
every year.
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No. 6. Receiving tank at Onondaga penitentiary; colon bacilli in large numbers.

No. 7. Tap in cell No. 4, occupied by Wright, sick with typhoid; colon bacilli.

No. 8. Tap in bakery at Onondaga penitentiary; colon bacilli.

No. 9. Tap in cell of Bush; colon bacilli.

No. 10. Tap in bath of Markell's private rooms; colon bacilli in large numbers.

No typhoid bacilli were found, nor did I expect to find any, but have considered the Onondaga penitentiary infection to arise from water in main reservoir polluted by drainage from Puffet privy, 36 feet south of M. residence, which privy had thrown into it undisinfected typhoid stools from a boy at Puffet house. This boy is said to have roamed about the country freely and probably drank water at several places, some of them perhaps questionable. He may also have drank from the Alvord spring, where Higgins (first case) obtained his water.

The village of Jamesville has been known for the number of typhoid cases it had in former years. Some eight years ago I examined different wells on South street west of creek and found them all polluted with colon bacilli. There were then, as I remember, about 23 cases of typhoid in Jamesville. There have been more or less there each year. For *convenient* reasons it is often called malaria. Many of the farmers own milk routes farther south and west, and perhaps that may be the reason it has not been so much heard of in last few years.

It certainly would seem a very poor sanitary work to allow a water supply of a public institution to be built and used with a privy in active use 36 feet away and in course of its flow of water, to say nothing of a manure pile 30 feet south. I note what you say to superintendent about cases on watershed several miles away and above, but perhaps some nearer source would be found if searched for. You remember the limekiln about 40 rods south of Alvord spring. The workmen are accustomed to obey calls of nature all along roadside and well within watershed of this spring.

Very sincerely

W. H. MAY

TOWN OF ATHENS

Typhoid fever

ATHENS, GREENE COUNTY, N. Y., *October* 7, 1903

DANIEL LEWIS, M. D., *Commissioner of Health, Albany, N. Y.:*

Dear Doctor—Two cases of typhoid fever at the residence of Mr. Sprague in this town have been reported to the local board.

It is a summer boarding house, and after returning to their homes in the city fourteen of the boarders have developed the fever also.

The board have made a thorough investigation and have concluded the source of contagion is in the well water. There are three wells on the place and the water from each will have to be tested.

Will you kindly advise me what quantity of water, how and to whom to send it; also to whom will the expense of examination be charged?

Sincerely and fraternally yours
ANDREW H. GETTY
Health officer

ALBANY, *October* 21, 1903

Dr. DANIEL LEWIS, *Commissioner, State Department of Health.*
City:

Dear Sir—I have the honor to report the results of an investigation of an outbreak of typhoid fever at Athens, Greene county, made by me October 16, 1903.

From information obtained from Dr. A. H. Getty, health officer of the town, I learned that cases of typhoid fever had been reported as occurring in the family of a Mr. Sprague, living about two miles south and west of the village of Athens on a high ridge of land, about two hundred and fifty feet above the Hudson river.

In company with Dr. Getty I visited the property and obtained the following history of the affair from Mr. Sprague. On August 20th a man and his wife and young baby came to board at his house. About the same time he had forty or more other summer boarders staying with him. The man referred to was not well and thought he had malaria, but he went around the grounds. He and his family occupied a room in an extension to the main house, used in winter as a kitchen. In the room is a sink, the outlet of which leads into a drain which passes out from the basement down the slope of the ridge leading to the east. This drain is laid under ground and consists of glazed tile pipes originally tightly joined as far as the eastern edge of the house and veranda, and from that point outward it is built of rocks without cement and runs a distance of about sixty feet, where it opens in the side of a bank. The dug well, from which water for drinking purposes is obtained, is located on this same slope about twenty feet from the termination of the glazed tile portion of the drain. The well is partially covered with a well-made plank top, which, however, is level with the ground, which from the well slopes steeply upward to the house, especially towards the extension occupied by the indisposed man. The man and family were told not to use the sink for the purpose of washing the baby's clothes, etc., but to take such water to the outhouses which are located on the west slope of the ridge two or three hundred feet from the house. None of the closets or outhouses were in any way connected with the drain above referred to, and the latter was ordinarily used only to carry off the kitchen and laundry waters.

The indisposed man was observed not to be careful in his habits, and the supposition is, and a very probable one it is too, that some of the discharges from this person were thrown out the window onto the slope leading to the well, or were washed into the sink whose outlet was the tile drain passing into an open drain within twenty feet of the well. This man left the place September 10th, and it was at that time that the cases of typhoid fever began to appear. Those occurring at the house came on together and are two in number. Others to an uncertain number have occurred in boarders who have returned to their homes in

New York, Boston and Philadelphia, and the indisposed man was reported to Mr. Sprague as having an attack of the disease. About the last of August and the first of September heavy rains fell in that section, and any discharges or urine thrown on the slope leading to the well could have easily been washed into it.

The milk at the house comes from the cows on the farm belonging to it, and the cans, pails, etc., are washed with rain water collected in a water-tight cistern located a hundred feet north from the well on the same slope. It could hardly be contaminated. No unusual number of flies were around the house during the summer, and all food was protected from them.

The most satisfactory explanation of the cause of the outbreak is that the indisposed man was suffering from a mild attack of typhoid fever, and that he carelessly infected either the surface of the ground sloping towards the well or infected the drain which practically emptied underground within twenty feet of the well. The well water thus became infected and caused the disease to break out in those drinking it. Many of the persons left for the large cities before the disease manifested itself in them.

Mr. Sprague is more than anxious to prevent any possible recurrence of the disease, and will relay the drain throughout its entire length with six-inch iron pipe, with tight joints, and will cement the stone walls of the well and build a water-proof brick wall a foot high above ground on the top of the stone wall, and also lay diverting pipes on the slope above the well, so as to carry off the surface water away from the walls of the well.

The infection of these persons illustrates the ease with which an epidemic of typhoid can be brought on when a careless person suffering from a mild attack of the disease goes to any one of the thousands of summer hotels, boardinghouses or private residences in the state where wells are the source of the water used for domestic purposes. It is only when special precautions are taken in the construction of these wells and the most careful attention is paid to the disposal of the excreta of all the persons connected with or living in such an establishment that a reasonable sense of security is warranted. The method of disposition of excreta and the construction of these wells are usually the worked-out ideas of the untrained owner of the hotel or boardinghouse. In consequence very probably 90 per cent of the so-called "dug" wells of the state are only awaiting the arrival of the careless case of walking typhoid fever to be able to give out the death dealing disease with every glass of their contents.

Yours very truly

HERBERT D. PEASE

TOWN OF LA FAYFTTE

Typhoid fever

WAVERLY, N. Y., *October* 26, 1903

DANIEL LEWIS, M. D., *Commissioner of Health, Albany, N. Y.:*

Dear Sir—By request of Dr. F. C. Curtis visited La Fayette, Onondaga county, in cases of typhoid fever existing mainly in the family of Thomas Eaton, residing in the town of La Fayette. I beg to submit the following report, to wit:

October 22d, proceeded to La Fayette. October 23d visited La Fayette. Called upon health officer, Dr. C. S. Williams; with him drove out in the country about two miles and visited the family of Thomas Eaton, occupation a farmer. His residence situated on high mountainous land facing the north, sloping gradually and abruptly to a distance of a thousand feet or more to marshy meadow land. On the south the land continues to rise to an elevation of a hundred feet, more or less. On the east ten or fifteen rods distant a small ravine causing good drainage for storm water from buildings. On the west thirty rods or more distant a deep ravine to which the larger body of farm lands slope and storm water courses to the marshy lands below on the north.

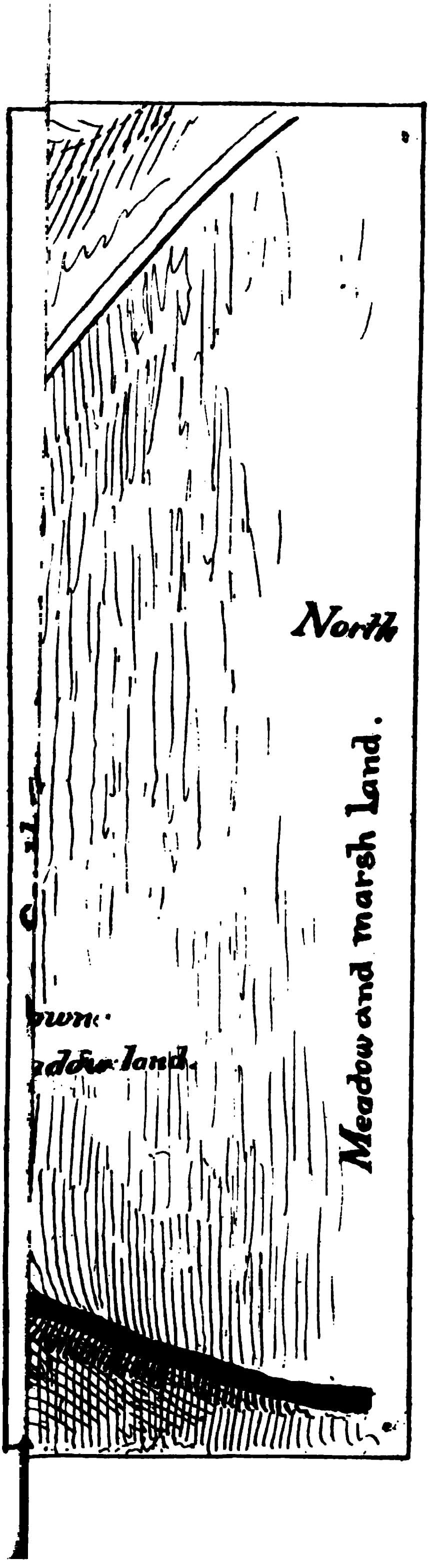
The residence and other buildings estimated to be about seventy years old, fairly well preserved. Attached to the house at the rear is a large woodshed probably twelve by fifteen enclosing a cistern and privy in a condition of decay. The floor covering the cistern broken down and surrounded with old wood and chips in a rotten state, and the exhalations from which are so characterized.

The privy vault not excavated to any extent, emitting an offensive odor. In this woodshed the domestic washing is done and nothing seems to prevent the débris passing into the cistern. The barn, wagon house and other small buildings situated four or five rods farther to the rear on ascending ground. Thirty rods to the rear of the barn and east on still higher ground in a large pasture field is located a spring of clear, sparkling water, carried to the barn, its affluent entering a long trough, the overflow of which coursing to the ravine on the east. The drainage from the home and buildings is chiefly to the east and west. The soil a gravelly loam. At the northeast corner of the house is a stoned-up dug well about thirty feet in depth, at the side of the front porch entrance in the house, and not more than fifty feet from the privy vault and woodshed at the rear.

It will be observed from the natural formation of the ground the gravitation of soil moisture is in the direction of the well at the northeast corner of the house. The premises are surrounded by large open fields of farming and pasture lands.

The following history concerning the illness of the Eaton family obtained from himself, wife and members of his family and Health Officer Williams:

Family consisted of Thomas Eaton and wife, Robert and wife, and their child, age two and a half years; Charles, Olive, John Jones, hired man. It appears on January 27th last the marriage ceremony of Olive Eaton, age 21, was celebrated at the homestead with a large wedding. Mrs. Nellie Edgcomb, née Eaton, and her husband from Ithaca were present. Nellie came a few days in advance. January 22d she complained of general lassitude and shortly after returned to Ithaca. It is proper to note at this



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time, typhoid fever is said to have been first reported in Ithaca. She continued ill, suffering from typhoid fever terminating in complete recovery, without complications.

Case No. 2. Nora Eaton, wife of Robert Eaton, age 25, pregnant. Taken ill February 13th, had a severe course of fever with relapse, recovery complete.

Case No. 3. Mrs. Thomas Eaton, age 56. Taken ill February 13th, her case typical of typhoid fever. No complications and recovery complete.

Case No. 4. Thomas Eaton, age 59. Taken ill March 2d. His case typical. No complications. In bed nine weeks. Recovery complete.

Case No. 5. Robert Eaton, age 26. Taken February 28th, light form of fever. No complications; recovery complete.

Case No. 6. Robert Eaton's little son, age two and a half years. Typical case of typhoid fever. No complications; recovery complete.

Case No. 7. Charles Eaton, age 16. Single; taken ill February 24th. Malignant typhoid fever. Complication cardiac insufficiency, large bed sore in sacro lumbar region resulting in death April 15th.

Case No. 8. George Edgcomb, age 31, husband of Nellie, residing in Ithaca. Visited the Eaton home June 28th. Taken ill July 20th in Ithaca. His case typical; no complications; recovery complete.

May 14th last, health officer, Dr. Williams, disinfected the premises in conformity with the sanitary regulations recommended by the state department of health in cases of infectious and contagious disease, viz, sulphur fumigation, woodwork washed with 5 per cent solution carbolic acid, in connection with mercuary bichloridi, 1:500. A trench had previously been dug some 30 rods on the west slope from the house 4 feet in depth, where had been thrown the disinfected excreta treated with chloride of lime, filled in and tamped.

Privy vault cleaned and treated with disinfectants, which had no stools deposited therein except those from Case No. 1, before the diagnosis of typhoid fever was made.

It is said gallons of mercuary bichloridi solution and carbolic acid were thrown in the vault which remained from the solution used in cleaning the woodwork, furniture and other materials. Beds and bedding fumigated, fabrics of all kinds exposed, boiled and placed in antiseptic solution. The premises outside inspected, thoroughly cleaned, and placed in what was considered a good sanitary condition. The water from well and barn both used for domestic purposes placed in sterilized bottles and sent to the Geneva experimental station for examination chemically and bacteriologically and reported in the negative, except a slight excess of organic matter. Previous to this disinfection Health Officer Williams had no professional connection with the cases. He states the cases were not reported to him by the physician in attendance. It is alleged, a few stools from the first cases after disinfection were thrown on the ground surface far removed from the house.

May 12th the family membership changed. Robert Eaton and family moved, John Eaton and family from Pompey taking their place.

Case No. 9. Ralph Eaton, single, taken ill July 31st. Sent to Geneva city hospital. He suffered from a typical form of typhoid fever, without complications, and made a complete recovery.

Case No. 10. John Jones, hired man, single, age 26. It appears during the illness of Cases Nos. 1 to 8 he was not a member of the Eaton family. He assisted in the work upon the farm, but resided about a quarter of a mile distant. May 18th he commenced to live in the family, and was taken ill August 26th, suffered from general lassitude and other suspicious symptoms of typhoid fever. August 29th he was sent to Syracuse city hospital, where he went through the course of the disease of a slight form and made a good recovery.

The above case is the first member of the family coming under the professional care of Dr. Williams, health officer of La Fayette.

Case No. 11. John Eaton, married, age 31, taken ill September 11th. Came under Dr. Williams's professional observation September 18th, and developed a severe type of typhoid fever, complicated with hemorrhages, cardiac insufficiency, resulting in death October 19th. Trained nurses were employed and best sanitary regulations observed.

It is alleged that prior to this time trained nurses had been employed. All excrementitious matter disinfected, taken to the ditch, covered and tamped. Vessels thoroughly cleansed in boiling hot water, and fabrics placed in antiseptic solution and boiled before washing.

Since the death of John Eaton the premises within again fumigated with sulphur, which was completed October 23d, and on said date samples of water again taken in bottles made sterile from well, spring at barn, cistern, and the same forwarded to the Geneva experiment station for examination.

The water supply for all purposes ordered to be boiled before using and milk since the illness of John Jones.

Case No. 12. Earnest Eaton, single, age 24, taken ill with suspicious symptoms October 17th. Sent to his home in Geneva October 18th. He is reported ill with typhoid fever. It is alleged he drank no water or milk not boiled while at the Eaton homestead. October 23d, during the cleansing of the well, fur, similar to that of a rat or cat, was found in the dipped-up water, but further investigation disclosed nothing in connection with it.

It appears those members who have resided at the homestead since the wedding have suffered from typhoid fever, with the exception of John Eaton's wife and little girl, and Olive, who was married January 27th. She returned after her wedding tour and assisted in the care of the family.

It is alleged carelessness existed during the first cases and no sanitary precautions were employed. Starting with the first illness, January 22d to March 2d, no trained nurses were in attendance, and no antiseptic precautions taken until about February 17th last.

It seems to me infection is direct. While much has been done, and apparently well done, I feel more should be done, particularly concerning the woodshed and privy vault. The odor in this locality is particularly offensive and sanitary attention should be given to it. It was suggested to remove the contents of the whole concern, and thoroughly disinfect the same.

Sincerely yours
WM. E. JOHNSON
Secretary state department of health

TOWNS OF HYDE PARK AND POUGHKEEPSIE

Typhoid fever

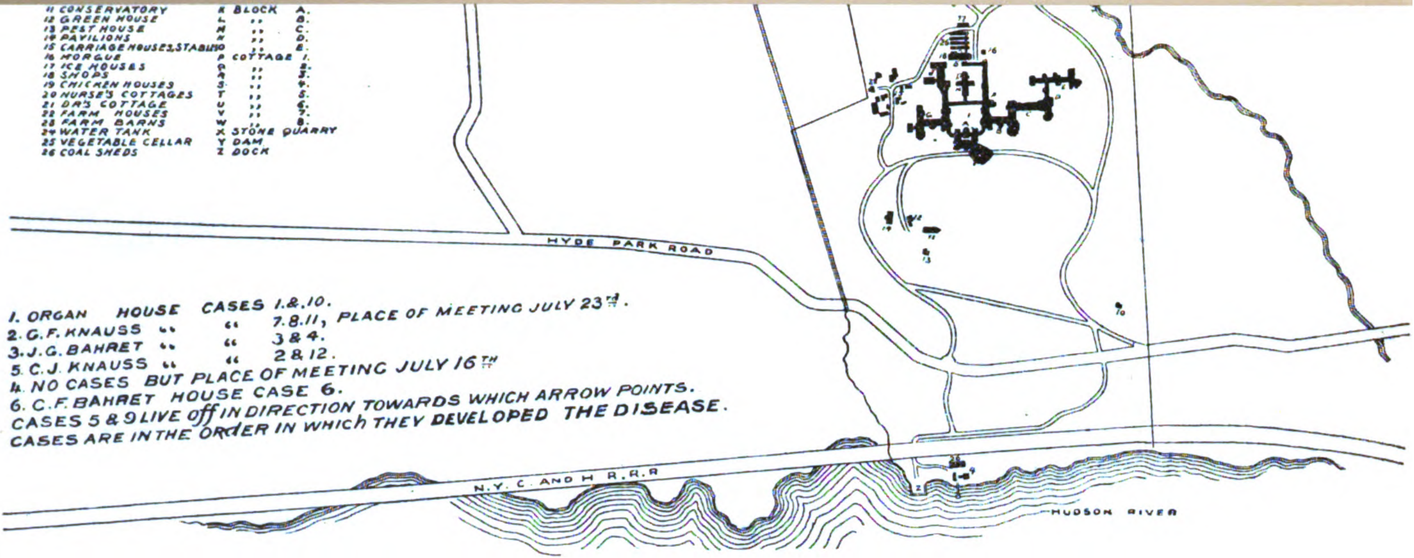
ALBANY, *August* 31, 1903

Mr. T. A. STUART, *Acting Commissioner, State Department of Health, Albany:*

Dear Sir—I desire herewith to report the results of the investigation of the cases of typhoid fever in the towns of Hyde Park and Poughkeepsie made by me on August 21st. I am indebted to Dr. J. M. Cronk, of Hyde Park, and Drs. Peckham, Cotter and Burns, of Poughkeepsie, for much of the information concerning the individual cases to be referred to.

In all there are thirteen reported cases of typhoid fever. Examinations of the blood of these cases for the serum reaction show eleven to be genuine cases of typhoid fever; one is doubtful, but in all probability is a case of that disease, while the thirteenth case probably is not typhoid fever. All but two of the genuine cases belong in one family group. Three of these component families live on Violet avenue, in the town of Hyde Park, near the dividing line between it and the town of Poughkeepsie; the other families of this group, four in number, live a mile or more from the other three in three different directions. (See accompanying chart of the location of these houses.)

The first case occurred in the family of a Mr. Organ, who also lives on Violet avenue, right in the group of houses occupied by



1. ORGAN HOUSE CASES 1.&.10.
2. G.F. KNAUSS " " 7.8.11, PLACE OF MEETING JULY 23RD.
3. J.G. BAHRET " " 3 & 4.
5. C.J. KNAUSS " " 2 & 12.
4. NO CASES BUT PLACE OF MEETING JULY 16TH
6. C.F. BAHRET HOUSE CASE 6.

CASES 5 & 9 LIVE off IN DIRECTION TOWARDS WHICH ARROW POINTS.
CASES ARE IN THE Order IN WHICH THEY DEVELOPED THE DISEASE.

the three families referred to above. His son, Floyd, was taken ill about July 1st. Although very ill at the time, so much so that he does not recollect his movements for several days, he did not go to bed, but wandered around the house, and states that he took care of a horse in the stable of his neighbor, Mr. G. F. Knauss. The house and stable of G. F. Knauss are located about 120 yards from the house of Mr. Organ. The Organ family, being new to the neighborhood, had very little to do with the other families in this district, and the only personal connection I was able to make out was the work done by Floyd Organ in the stable of Mr. G. F. Knauss. All the other cases of the disease have occurred in the families named Knauss and Bahret. The first of these subsequent cases occurred in the house of J. G. Bahret. These two cases became seriously ill on July 26th and 27th, and about this time Mr. C. I. Knauss, living about a mile away, was taken seriously ill with the disease. This was followed by case 5, which occurred in Mr. Fred. Bahret, who lives a mile or more in another direction. Case 6 was Mr. C. F. Bahret, who lives about a mile from the central focus of the disease. A question arises concerning this case, whether he did not have the disease before he was obliged to go to bed, on August 3d, for two weeks or more. He had been sick from some time before July 16th until August 3d and had taken a trip to Ocean Grove for the sake of his health in the meantime, but on his return he became seriously ill. The question arises whether he contracted the disease from his contact with the families living at the focus of the disease or whether he had the disease before the others and possibly spread it amongst them.

The families of Knausses and Bahrets are in the habit of meeting at the house of one of their number every Thursday. Two of these meetings occurred on July 16th and July 23d. The question arises whether the disease was disseminated by the first case in the neighborhood, Floyd Organ, or by C. F. Bahret, who attended the meeting of July 16th, and who had been ill for a few days at that time. It is impossible to make out which of these hypotheses is correct.

In either event the disease was transmitted from the original case to the other persons by the agency of flies or through the drinking water.

Flies were very numerous in that region at the time of the investigation, and no special precautions were taken in any of the houses to prevent their access to the living rooms of these dwellings. Inasmuch as the first case wandered around his own premises, and also the stable of G. F. Knauss, possibly contaminating the premises with his discharges, it is quite probable that flies carried infectious material into the neighboring houses and contaminated food with it.

On the other hand, the drainage from the Organ house runs toward a ravine which separates that house from the Knauss place. The outhouse of the Organ premises is also located on this slope. The infectious material on this slope may easily have contaminated the water supplying the wells in that immediate region. As will appear later, the wells connected with the houses of Mr. Organ, G. F. Knauss and J. G. Bahret all show evidences of faecal contamination and it is more than probable that one or more of them became infected from the discharges of Floyd Organ. Moreover, it is quite probable that these three wells at least derive their water from one underground water course. Engineers Ensign and Philips, of the State Engineering Department, who were working on Violet avenue at the time of the investigation, showed by a survey of the ground that the bottom and surface levels of the water in the wells did not vary to any great extent. This, taken in connection with the results of the examination of the water samples from these three wells, which showed a striking uniformity in the number of bacteria per cubic centimeter of each sample would strongly indicate the unity of the supply for all three wells. In that event the contamination of any portion of the underground course would probably mean the contamination of the whole series of wells. It seems to me that this is the most probable manner by which the infection of the persons living on Violet avenue was brought about.

The infection of the persons living at a distance can be readily accounted for by the frequent visits made by them to some one of the houses in the focus of the disease. It is impossible, however, to trace with certainty their infection to any one visit or meeting at the central focus of the epidemic.

EXAMINATION OF THE SAMPLES OF WELL WATERS

Sample A. Water from an outside well on the Organ property. Owing to the work of the engineers on this well just prior to the taking this sample, the water was quite muddy and the examination showed a higher bacterial count than would likely have been the case had the water not been stirred up. The average number of bacteria per cubic centimeter was 3,800. The colon bacillus was shown to be present, in the proportion of at least one organism to each cubic centimeter of the sample, by the fermentation test.

Sample B. Water from the well on the property of J. G. Bahret. Number of bacteria per cubic centimeter, 1,100. Colon bacilli present in the proportion of at least one organism to each cubic centimeter of the sample.

Sample C. From the well in the shed of G. F. Knauss. Number of bacteria per cubic centimeter, 1,300. Colon bacilli present in the proportion of at least one organism to each cubic centimeter of the sample.

Sample D. From the tank in the shed of G. F. Knauss. This tank was supplied from the well from which sample C was taken. The water in the tank had been standing for some time and was clearer than the samples from any of the other wells. The number of bacteria per cubic centimeter was 1,200. Colon bacilli were not found in 10 cubic centimeters of the sample.

Sample E. From the well of C. F. Bahret, located about a mile from the other wells. Number of bacteria per cubic centimeter, 550. Colon bacilli present in the proportion of at least one organism to each cubic centimeter of the sample.

In view of the state of affairs in that locality, I would strongly recommend that the following precautions be taken:

That the thorough disinfection of the discharge, including the urine, be continued for a period of two months, as typhoid bacilli frequently remain in these excreta for that length of time.

As the complete disinfection of the excreta is not always accomplished by the use of the usual methods, these materials should not be deposited on the ground or in a privy vault without the addition of chloride of lime and then covered with a thin layer of earth or ashes, to prevent the access of flies to them.

Extra precautions should be taken to prevent the access of flies to all food by all the persons living in that neighborhood.

All the water used for household purposes by the people of that region should be thoroughly boiled before its use. This should be continued for a period of several months at least.

Yours very truly
HERBERT D. PEASE

TOWN OF WEST SENECA

Typhoid fever

WAVERLY, N. Y., *March* 7, 1903

DANIEL LEWIS, M. D., *Commissioner of Health, Albany, N. Y.:*

Dear Sir—Your telegram of the 27th ultimo directing me to visit West Seneca, where it is alleged typhoid fever exists among the employees of the Lackawanna steel plant residing outside the works, and to investigate as to the number of cases, also as to possible pollution of public water supply of Buffalo, and confer with Dr. Green, health officer of Buffalo, if desired by him; will designate one of his medical inspectors to act as state inspecor for purposes of making investigation at West Seneca at such times as he may deem necessary concerning possible pollution of Buffalo water supply at this point. Also investigate as to disposition being made of excreta from typhoid fever. Having performed this duty, I beg to submit the following report, to wit:

March 2d visited the town of West Seneca, five miles distant from Buffalo by trolley. Called upon health officer, Dr. E. H. Ballou. In company with him and a majority of the town board of health and members of the citizens' committee lately organized made an inspection of hotels, boarding-houses, restaurants, and streets intersecting the main or business street on Ridge road leading to the steel plant a mile or more distant.

A brief description of the locality may be of interest and to aid more clearly representing the same have appended maps.

A ridge of land 26 feet in height running in an easterly and westerly direction mainly divides the city of Buffalo and town of West Seneca. On this ridge is the main road and trolley. Looking northerly the city of Buffalo. The natural drainage in this locality toward Lake Erie. Southerly a territory of low land approximately two miles square bordering on Lake Erie and but a few feet above the level of the Lake. Coursing through this territory runs Smokes creek, emptying into the lake, receiving the natural drainage and sewage of an estimated population of over 4,000 people. At the present time many acres are submerged by the high waters of Smokes creek and Lake Erie. Several buildings are now undergoing construction in the water and many "shacks" because of high water abandoned.

Near the banks of Smokes creek the steel company have erected a series of buildings under one roof extending possibly a thousand feet each in length for tenantry of employees. It is estimated when completed there will be in all 454 families. At present they are occupied by 108 tenants. Four cases of typhoid fever are known to have existed among the occupants. The sewage from those buildings empties into Smokes creek, which empties a short distance west into Lake Erie. The water supply in this locality from driven wells located near the banks of the creek, and in steel plant buildings furnished by the Lake Erie and Depew Water Company. From the same company most of the potable water is used in the business section along Ridge road of doubtful purity. In this low section and territory the foreign element reside in close proximity to the steel plant, constituting the laboring class, consisting of Italians, Polacks, and Hungarians, and chiefly among this class typhoid fever prevails to an unknown extent.

In one colony I counted 24 "shacks," each about 6 by 8 and 8 by 10, not fit for a respectable pigsty. Very many others exist of like character in various places in the locality along the creek and sections of territory described. On the Ridge road or business section are mainly located the hotels, restaurants, and boarding establishments whose proprietors are largely of the same element.

Inspection, with but two or three exceptions, reveals the most unsanitary conditions, due to a people housed and fed in rooms of various dimensions, with sleeping apartments containing beds closely arranged and occupied by two persons each sleeping with their clothes on packed like sardines in a box and without ventilation. The atmosphere can better be imagined than described.

The sewage from these premises empties into cesspools overflowing or thrown upon the surface of the ground. In one instance the sewer runs under the street, emptying on the opposite side into the open gutter. In one boardinghouse were found 100 boarders in a building about 30 by 40, and in this proportion in other buildings of lesser size.

It appears this influx of population due to the steel plant enterprise is simply existing in anticipation of better accommodations in the near future. It is estimated that a population of 20,000 people will occupy the territory when the industry is in full operation.

It will be observed in this section all the surface water and sewage enters Lake Erie either directly or indirectly through Smokes creek.

Proceeded to Buffalo. Called upon Dr. Green, health officer of the city, to whom your proposition of appointing a medical inspector to act as state inspector was submitted. Conferred

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with Dr. Bissell, bacteriologist for the city, city chemist, Prof. H. M. Hill, and Francis G. Ward, superintendent of water supply.

The prevailing winds are from the southwest, causing contaminated water to hug the east coast of the lake, or Buffalo shore. The winds from the east and north carry the contaminated water or sewage toward the Buffalo intake. (See map.)

Dr. Bissell, city bacteriologist, states the water is continually increasing in contamination. Especially after storms the typhoid rate increases. Examinations of water are made nearly every day in the year, at least 300 examinations are made, and invariably after storms are colon bacteria increased. These examinations have been conducted for the past ten years.

Prof. H. M. Hill, city chemist, came in the office of the city health department while I was present and reported he had just finished an examination of the waters of Smokes creek, which he finds "vile." He finds albuminoid, ammonias very high, and nitrites pronounced, with chlorine abnormally high. He further examined the water in Lake Erie one mile from shore 12 feet deep and one mile and a half 22 feet deep in vicinity of Smokes creek and found the water greatly contaminated.

March 3d, with Dr. Green, health officer of Buffalo, visited West Seneca in order to make a more extended investigation— Dr. Green, in order to familiarize himself with the situation concerning the pollution of water in Lake Erie, as it may affect the water supply furnished the city of Buffalo from the intake in Lake Erie—in company with him, Dr. E. H. Ballou, members of the board of health, and a representative of the citizens' committee, visited the territory described, with observations as heretofore embodied in report.

The excreta from typhoid patients is generally supposed to be thrown upon the soil surface, deposited in privy vaults, or water-closets. No antiseptic precautions observed or sanitary regulations except in rare instances of the few cases among the civilized portion of the community, whose physicians report to the health officer and intelligently care for their patients.

A sewer system is badly in need. Advice given to boil all water used and for all purposes. Isolate if possible all cases of typhoid fever found. Disinfect all discharges from patients, including urine, with germicidal agents. After recovery fumigate apartments of patients, textile fabrics thoroughly, and clean all articles with suitable antiseptic solutions.

Truly yours
WM. E. JOHNSON
Secretary state department of health

TYPHOID FEVER AT ITHACA

ALBANY, *February* 7, 1903

DANIEL LEWIS, M. D., *State Commissioner of Health:*

Sir—The records show that for the past two or three years Ithaca has had an autumnal prevalence of typhoid fever. In 1900 and 1901 the mortality rate from this cause was about 40 per 100,000 population; in 1902, however, there was but a single death.

About the middle of January of this year there abruptly set in an epidemic of great severity. January 17th the first case appeared in the hospital and within three days there were 8 cases. New cases were reported daily and at the time of my visit, February 5th, there had been perhaps 500 cases in the city. They occurred without order of sequence throughout the city and were distributed everywhere with a few exceptions; the most marked was that of the University campus or grounds on which the permanent population consisted of the families of some of the faculty and a woman's dormitory, among whom no case had occurred. A new part of the city not fully supplied with public water and sewers likewise was partially exempt. But generally the cases were distributed all over the area of the city.

The disease was typhoid fever beyond doubt, for there was general response to the Widal test. It was of mild type and the mortality rate was low, although it was early yet to show that.

An epidemic of typhoid fever, fulminant in onset, occurring at an unusual season, and widespread in its distribution, must arise from a suddenly produced, unusual cause, of general application. Infected milk is first thought of and was at once looked for. But it existed among families taking milk from many sources, and there was no trace of possible infection among any of them. No other of the extraordinary and unusual causes of a typhoid fever epidemic were discoverable, and the common, well-nigh universal cause alone remains, the water supply.

Ithaca is furnished with water by a private company, from three small streams known as Six Mile creek, Buttermilk creek, and Fall creek. To some extent different areas are separately supplied from one or other of these; for instance, the University campus gets its supply exclusively from Fall creek. But generally the distributing pipes are so arranged that the reservoirs collecting these waters separately can receive a mixture of all, at least for a good part of the town. It is quite certain that the fever prevailed extensively in the area supplied by Six Mile creek, but to no degree exclusively; this, however, under the circumstances would not be expected.

During the fall, and until cold weather suspended operations. a dam was under construction on Six Mile creek, above the reservoir. On the work 300 Italian laborers, imported from outside this vicinity, were employed, and they encamped on the banks of the stream. It is said, but not verified, that there were cases of sickness among these people; they all disappeared several weeks before this outbreak and are beyond the reach of investigation.

So far as can be ascertained, and the investigation has been exacting, no case of typhoid fever has recently occurred among the permanent residents of the watershed. The creek is one which lends itself readily to pollution, having much of its way abrupt, ravine like banks, and passing through farmed lands with dwellings and farm buildings along its course. Its immediate infection with specific typhoid germs to produce this outbreak must have been, however, from an extraneous source, and there seems reason to believe that among the force of men referred to there must have been one who carried these and deposited them on the steep side of the stream, whence they were carried into the stream with the first thawing weather.

Analysis of the water at various points had already been made, showing the water to be of poor quality, and especially so of samples taken from points supplied from this Six Mile creek. I have samples taken from the different sources of public supply, which were sent to the laboratory of the State Department of Health for examination, and all of them show contamination and evidence of the presence of intestinal material.

The following is the report of the Director of the laboratory:

"ALBANY, *February* 18, 1903

"DANIEL LEWIS, M. D., *Commissioner, State Department of Health, City:*

"Dear Sir—I have completed the examination of the six samples of water recently sent down from Ithaca, N. Y., and would report as follows:

"Water No. 1, marked 'Campus, Fall Creek Water.' Number of bacteria to the cubic centimeter on agar plates, 545; on gelatin plates, 7,540; average, 4,000. The fermentation test shows the presence of organisms which produce the colon type of gas formation in the proportion of two bacteria to each six cubic centimeters of the water. These organisms were isolated in pure culture, and grown upon the different media, and corresponded in every way with the bacillus coli communis.

"Water No. 2, marked 'Six Mile Creek Water, Quarry St., near East Hill School.' This water arrived in bad condition, the glass stopper of the bottle having become loose, and most of the water having leaked out. The number of bacteria per cubic centimeter in what remained was, on agar plates, 2,620; on gelatin plates, 6,830; average, 4,725. There was only sufficient water left to inoculate two fermentation tubes, both of which showed gas, but in neither of them was the colon type of gas production present. We consider this examination unsatisfactory.

"Water No. 3, marked 'Creek above the Water Works.' Number of bacteria per cubic centimeter on agar plates, 1,270; on gelatin plates, 20,600; average, 10,935. No colon bacilli were detected in this water by the fermentation test, nor by a modification of McConkey's method.

"Water No. 4, marked 'Artesian Well flowing, called Illston Well.' Number of bacteria per cubic centimeter on agar plates, 5; on gelatin plates, 35; average, 15. No gas formation was present in the fermentation tubes inoculated with this water.

"Water No. 5, marked 'Faucet in City Hall.' Number of bacteria to the cubic centimeter on agar plates, 13,700; on gelatin plates, 53,000; average, 33,350. By the fermentation test the colon bacillus was found to be present in the proportion of one organism to each seven cubic centimeters of the water.

"Water No. 6, marked 'Buttermilk Falls Creek Water.' Number of bacteria to the cubic centimeter on agar plates, 660; on gelatin plates, 3,930; average, 2,300. The fermentation test showed the colon bacillus to be present in the proportion of two bacilli to each seven cubic centimeters of water.

"Remarks: Interpreting the results of these findings, it must be remarked, first of all, that the water did not reach us until 76 hours after it was collected. We therefore feel that the deductions can not very well be made regarding the quantitative tests. The bacterial count in all of the waters except No. 4 is of course excessive, but the fact that three days had elapsed before the examination of the water would explain the excessive count. The presence of the colon bacillus in waters Nos. 1, 5 and 6 indicates the presence of organic contamination. It also indicates the possibility that the typhoid bacillus may likewise have been present. We attempted in the case of all of these waters, with the exception of No. 2, to isolate the typhoid bacillus by means of a modification of McConkey's bile-salt medium, but we were entirely unsuccessful. We feel that the interpretation to be placed on the colon bacillus in waters Nos. 1, 5 and 6 must be determined by the local authorities at Ithaca, who will best be able to judge whether there is evidence of contamination with human excreta, or whether the contamination may have come from animal excreta.

"Respectfully submitted.

"GEORGE BLUMER"

The immediate necessity for the control of this epidemic, being beyond doubt due to an infected water supply, is to prevent absolutely the use of this water for all drinking and domestic purposes unless first sterilized by boiling. To secure this it was advised that printed notice of what is necessary be served on each householder and published in the public press. This, with such suitable inspection as may be necessary to emphasize and secure it, and the suitable disinfection of excreta with such absoluteness as is available are the prime requisites. It is to be hoped and probably anticipated that the primary cause will expend itself, the service pipes by blowing off and use will become freed of infective material and the abrupt epidemic may within a few weeks, if secondary cases can be prevented, come to almost as abrupt a termination.

Respectfully submitted.

F. C. CURTIS

Dr. DANIEL LEWIS, *Commissioner Department of Health, State of New York, Albany, N. Y.:*

Sir—In compliance with your request, the following brief report concerning the typhoid epidemic at Ithaca in 1903 is herewith respectfully submitted.

REPORT ON AN EPIDEMIC OF TYPHOID FEVER AT ITHACA, N. Y., 1903

The typhoid epidemic which occurred at Ithaca in the early part of 1903 was one of the most serious in the history of New York state. It is estimated that out of a population given by the United States census bureau as 13,136 in 1900 and about 3,000 students, 1,350 people were taken sick. The exact number of cases will never be known for the reason that accurate statistical records were not kept during the early part of the epidemic.

When the number of fever cases reached about 1,000, the local board of health called upon the State Department of Health to send an expert to take charge of the situation. The request was complied with and the present writer was selected for the post.

A plan of action was formulated on March 5 in order to gain control of the situation. This plan embodied the following lines of action:

Plan of action against the epidemic

1. The original source of infection was to be cut off as far as practicable.

2. The transmission of the disease from person to person was to be guarded against.

3. Sanitary reforms were to be introduced in order to guard against a recrudescence of the epidemic.

Sanitary measures which were adopted

Among the sanitary measures for the accomplishment of these objects were:

1. The introduction of a system for the more prompt and accurate reporting of cases by the physicians.

2. The collation and careful study of these reports.

3. The preparation and distribution of disinfectants of standard quality with explicit directions for their use.

4. The establishment of laboratory facilities for the analysis of blood and urine to assist in the diagnosis of suspected cases of fever and to discover the presence of typhoid bacilli in the urine of convalescents.

5. The control of convalescents: No patients whose urines were infected with typhoid germs were allowed to leave the hospitals or relinquished from private medical care.

6. The inspection and control of the milk and bottled water supplies of the city, in order that they might not become infected.

7. The cleaning of all the privies in the city, numbering above 1,000.

8. The construction of a system of garbage collection and the introduction of an improved method of street cleaning.

9. The analysis of the water of the 1,200 private wells in the city.

10. The inauguration of a thorough municipal house cleaning.

11. The sanitary inspection and improvement of student boarding-houses.

12. The construction of drains and sewers where these were greatly needed.

13. The fumigation of houses believed to be infected by reason of improper care of the sick.

14. Instruction in measures of domestic hygiene, by means of lectures and popular articles prepared for the press.

15. In addition to the foregoing, a careful examination was made of the drainage areas supplying the city with drinking water in the hope of determining the exact source from which the infectious material which had caused the epidemic had entered the water supply.

The cost of the epidemic

The sanitary work done along the lines just indicated cost the local board of health $10,000. Besides this, about $5,000 were spent in cleaning privies; about $10,000 for plumbing and other improvements to student boarding-houses and other dwellings; $3,000 for a garbage plant and an improved system of street cleaning and $70,000 for a filtration plant for the purification of the public water supply. This makes a total of $98,000 spent between March 4 and September 1 to eliminate typhoid fever from Ithaca and provide against its reappearance.

The results have justified these expenditures. The epidemic ceased soon after the work began and there has been practically no fever in the city since it was finished.

The money loss to the city through sickness and death and through loss of trade due to the notoriety resulting from the epidemic probably reached several million dollars.

The cause of the epidemic

The cause of the epidemic was an infected public water supply. This, and this only, of all articles of food and drink, was common to the majority of the victims. Numerous sources of pollution of the water supply were obvious. The water was drawn from two creeks after they had run through several villages and a small farming country. No restraint was exercised over the drainage into these streams. On one of the creeks (Six Mile), with an area of 47 square miles, there were 531 houses, inhabited by 2,124 persons. The nearest village had an estimated population of 328 and was situated directly on the creek, 7 miles above the waterworks intake. Privies overhung and emptied into the streams. The creek is torrential in character; during dry summer weather the flow per twenty-four hours may be less than 1,000,000 gallons; at times it has been estimated to be over 3,000,000,000 gallons.

On the other (Buttermilk) creek, with an area of 12.5 square miles, there was an estimated population of 616. About 200 of these people lived in a small village five miles above the intake of the Ithaca water supply. Privies and barnyards drained into the stream.

Within the limits of the city, and but a few rods above the intake of the waterworks, 17 privies drained into the main creek. Within the watershed of this creek and less than 10 miles from the intake of the waterworks 8 cases of typhoid had occurred within the last year.

The location of the exact source of the infectious material which produced the epidemic was not determined, notwithstanding a most careful investigation was made for this purpose. With so many sources of pollution it was impossible to detect the particular one which caused the outbreak.

Warning of the epidemic

There was ample warning of the epidemic. Newspaper reports and official statements by the local board of health had for years pronounced the public water supply unfit for consumption. Intestinal disorders, sometimes resembling typhoid fever, had not been uncommon at Ithaca. But the people had become accustomed to these disorders and to the repeated warnings of the board of health, and measures of protection against the water were by no means universally taken.

Beginning and course of the epidemic

The epidemic began in the first half of January soon after a heavy rain and thaw. In the first week cases occurred in nearly all parts of the city. The disease was at no time exclusively localized in any section. Wherever the water from Six Mile and Buttermilk creeks was furnished there was typhoid and there was little elsewhere.

One part of the city suffered a little more severely than the rest. This was the large section known as East Hill, the center of a student population attached to Cornell University. About 40 per cent of all the known cases occurred here. Probably one reason for the excessive amount of typhoid fever on East Hill was that the students were especially susceptible to typhoid fever by virtue of their age and another that the students at Cornell lived for the most part in boarding-houses, where they were often given unboiled water to drink.

The epidemic began on January 11 and ended April 15, 1903. Its onset was gradual. The maximum number of new cases per day (70) did not occur until the twenty-second day of the epidemic. The last day on which there were three or more new cases reported was May 15th, the sixty-third day of the epidemic.

The number of homes in which cases of typhoid fever was known to have occurred was 552. Among 151 houses 420 cases appeared. In many houses there were several cases; in one, a large students' rooming and boarding house, there were 9 cases. The 9 broke out in three stages: February 1-4, February 17-20, and March 9-10.

The total number of cases which probably occurred in the epidemic was 1,350. The number actually reported was 955.

The epidemic exhibited a low rate of mortality. As near as could be learned, the total number of deaths was 82. The actual number was undoubtedly larger.

Conclusion

The Ithaca epidemic illustrates the danger of a water supply unprotected by sanitary regulations, filtration, or other safeguard. It illustrates also the fatal consequence of public indifference to a class of unhealthful conditions which exist to an alarming extent throughout the country.

Very sincerely

GEORGE A. SOPER, PH. D.

June 30, 1904.

BUBONIC PLAGUE

San Francisco

By Mr. Ellis. Whereas the recent conference of representatives of state boards of health, at Washington, revealed the alarming spread of the bubonic plague on the Pacific coast and the lamentable lack of effort on the part of the health authorities of the afflicted section to stamp out the disease; and

Whereas the conference determined that unless speedy measures are taken by the Pacific coast states it will be necessary for the federal authorities to take cognizance of the spread of the malady and that action on the part of the health authorities of the states of the middle west and the Atlantic coast will soon be imperative; therefore, be it

Resolved, That the commissioner of health of the state of New York report to the Assembly the part taken by him in the Washington conferences and the plans adopted or proposed to be adopted to prevent the introduction of the bubonic plague into this state.

I hereby certify that the foregoing is a correct transcript of a resolution duly adopted by the assembly of the state of New York February 2, 1903.

RAY B. SMITH,
Assistant clerk

ALBANY, *February* 11, 1903

Hon. S. FRED NIXON, *Speaker of the Assembly:*

Dear Sir—In response to the resolution passed by the assembly calling for information concerning the bubonic plague in San Francisco, and asking what steps, if any, the State Department of Health has taken to prevent its spread to this and other states, I beg leave to report as follows:

The first cases of bubonic plague occurred in San Francisco (Chinatown) nearly three years ago and were promptly recognized by the health authorities of the city of San Francisco and the state of California, who immediately took measures to prevent its spread.

The state authorities, thinking that the existence of plague in the city would be an injury to the commercial interests of the Pacific coast and of San Francisco in particular, took issue with the health authorities as to the disease being plague, and their opposition, aided by a considerable portion of the press of the state, has continued until recently. In the meantime there have been ninety deaths from the disease in Chinatown, the fact of it being plague having been thoroughly established by post-mortem examinations carried out under the direction of the United States Health and Marine Hospital Service.

The menace to the public health consequent upon a *denial of the existence of plague in Chinatown,* when its prevalence there had been scientifically determined, was regarded with great concern by the Conference of State and Provincial Boards of Health which held its annual meeting in New Haven last October. It was then determined to ask for the call of a conference by Surgeon-General Wyman of the United States Health and Marine Hospital Service to consider the situation.

The conference, at which nineteen states were represented, including the state of New York, was held in Washington on the 19th of January, 1903. The Surgeon-General read a detailed statement of the situation, and after a full discussion the result of the deliberations was a declaration, unanimously approved by the conference, that the lack of harmony between the state and municipal health authorities in San Francisco and with the federal authorities constituted a serious menace to the public health. It was also agreed that with intelligent cooperation between the local and federal authorities there would be practically no danger of the spread of the disease beyond that part of the city known as Chinatown and that the disease there could be eradicated by intelligent action.

It was further resolved that in case of the continued opposition of the state and city governments to the carrying out of the necessary measures against plague would render a quarantine against San Francisco a possible necessity in the future.

Since the proceedings of the Washington conference have been received in Californa both state and city authorities have promptly accepted the recommendations of the conference, and I have in my possession copies of telegrams from various sources in that state showing that the most cordial cooperation is now extended to the federal authorities in every measure which has been recommended for the eradication of the epidemic.

It is not deemed necessary under the circumstances to consider for a moment the institution of quarantine restrictions against San Francisco and there is no reason for any public alarm from the situation, now that the existence of the plague there has been universally admitted and is being properly treated from a sanitary standpoint.

DANIEL LEWIS
Commissioner of health

RESOLUTIONS UNANIMOUSLY ADOPTED BY THE JOINT COMMITTEE OF THE COMMERCIAL ORGANIZATIONS OF SAN FRANCISCO, FEBRUARY 2, 1903

Whereas the boards of health of other states and territories have become alarmed at the reports of bubonic plague in San Francisco during the past three years; and

Whereas but ninety-three cases have been reported by all health authorities during a period of these thirty-five months and that the last case reported was December 11, 1902; and

Whereas the health authorities of twenty-one states and territories, in a conference called for that purpose at Washington, January 19th, declared that the presence of plague had "been established beyond debate by the investigations of Kellogg of the city board; by Pillsbury and Ryfkogel of the state board; by J. White, M. White, Flint, Currie, Carmichael, Blue and Glennan of the Marine Hospital Service; by Flexner, Barker and Novy, a special commission acting under federal authority; by independent and disinterested investigators in Chicago, Boston, New York, Washington, Baltimore, Philadelphia and Ann Arbor, working from material obtained in San Francisco; by a case of human plague in Ann Arbor, due to an accident in the handling of a culture of plague bacillus obtained in California"; and said plague conference did attempt to declare a quarantine against California, to cause the transport service to be removed from San Francisco, and to place medical inspectors upon all the trains going out of the state, and but for the most strenuous efforts of Dr. Gardner, representative of the state board of health, would have succeeded in so doing; and

Whereas said conference did demand that the city and state health authorities act in harmony with the United States Marine Hospital Service to carry out any sanitary regulations which that service may deem necessary, or quarantine would be established against California at its next meeting to be held in April; and

Whereas the great interests of California, and especially those of San Francisco, demand that no neglect of our citizens should hinder the march of progress which has now been so happily begun; it is therefore

Resolved, That this mercantile joint committee, consisting of the officers and other representatives of the state board of trade, the San Francisco board of trade, the San Francisco chamber of commerce, the merchants' association of San Francisco, the merchants' exchange of San Francisco, the manufacturers' and producers' association of California and the California promotion committee hereby strongly urges the governor of the state and the mayor and supervisors of San Francisco to take such steps at once as shall secure a prompt cooperation of the boards of health of the city and state, under the supervision of the United States Marine Hospital Service, to the end that all danger from bubonic plague may be eradicated, that all fears of infection may be removed, that the confidence of the boards of health of the other states and territories may be restored and that no injury, however remote, may result to the foreign and interstate commerce, and to this end we hereby pledge to the officials of the state and city every aid and support of the various commercial bodies which we represent.

MERCANTILE JOINT COMMITTEE
FRANK J. SYMMES, *Chairman*
L. M. KING, *Secretary*

Representing: California state board of trade, San Francisco board of trade, San Francisco chamber of commerce, merchants' association of San Francisco, merchants' exchange of San Francisco, manufacturers' and producers' association of California, California promotion committee.

San Francisco, February 2, 1903

CANCER LABORATORY

Report of the Director.

BUFFALO, N. Y., *March* 17, 1904.

Dr. DANIEL LEWIS, *Commissioner of Health, Albany, N. Y.:*

Dear Sir.—I have the honor to transmit herewith the annual report of the Cancer Laboratory researches carried on under the auspices and by the aid of the Department of Health of the State of New York and in the Gratwick Laboratory of the University of Buffalo. The past year has not been characterized by any marked discoveries which can be safely announced to the world, but has been marked by steady, earnest and even laborious study along the lines of investigation, all of which are necessary and all of which are lending improvement in the study of cancer, either by chemical or biological means.

During the past year the staff of workers has included the following:

Dr. Harvey R. Gaylord...	Pathologist.
Dr. H. G. Matzinger.....	Bacteriologist.
Dr. G. H. A. Clowes.....	Chemist.
Dr. Gary N. Calkins.....	Consulting Biologist.
F. S. Low..............	Assistant in Photo-chemistry.
W. S. Frisbie............	Assistant Chemist.
Alice G. Owen...........	Assistant.
Clara A. Maclay.........	Secretary.
F. A. Payne.............	Janitor.
M. Weber...............	Laborer.
E. Kempkes.............	Laborer.

A portion of this time has been spent by Dr. Gaylord in Europe. Inasmuch as he was not working entirely in the interests of the Laboratory his salary was proportionately reduced. He has taken advantage of his presence in Europe to attend regularly the meetings of the Royal German Cancer Committee, of which, with myself, he is a member. He went to Copenhagen in the interests of the Laboratory to investigate the work of Jensen on the transplantation of carcinoma in mice. Professor Jensen was kind enough to give Dr. Gaylord some of his mice, which were brought to the Laboratory and used by Dr. Gaylord for the continuation and elaboration of the transplantation problem. A report from him is transmitted herewith. I also transmit herewith a paper by Prof. Gary Calkins, in which he has paved the way for still further announcements, of whose importance when made there can be no doubt.

One feature with which our study is more and more concerned is the variation of tumors of apparently the same general type, which are found to vary more and more, as do the personal features of different individuals of the same family. So marked is this variation that it becomes often confusing and makes it not only difficult to assign given specimens to their proper positions but even to indicate their relative degree of malignancy. Special attention has been given for the last few months to the study of tumors of the breast, in which Dr. Matzinger has been leader, and along the lines on which important theories have been advanced by Creighton in his remarkable new work entitled "Cancers and Other Tumors of the Breast."

The principal work of the chemical department in the course of the last year has been devoted primarily to the solution of the problem of obtaining immunity against cancer. Horses are being employed to prepare sera for use in incurable cases. Work of such a nature necessarily extends over long periods of time, and it will be impossible to give any final reports on this work in the immediate future. Experiments having a similar object in view are also in progress, making use of cancer mice kindly placed at the disposal of the Laboratory by Dr. Jensen of Copenhagen.

A great part of the time of the Laboratory staff has been devoted to work of a routine nature, several hundred analyses of stomach contents, urine, etc., having been carried out for the purposes of diagnosis. In several cases in which nutrition of patients has been seriously impaired systematic analyses of food and excreta have enabled us to materially improve their condition.

A part of the work undertaken by Dr. Clowes has been the chemical testing of the various staining fluids and materials used in order to better appreciate their reaction upon the cells constituting tumors, a subject on which there is much yet to be learned which will prove of value.

From the papers incorporated in this report and the abstracts of those published in the course of the last year in other journals, it will be seen that a considerable amount of work has been accomplished bearing on the physico-chemical problems of metabolism, the solution of certain micro-chemical problems and work of a serum-therapeutic nature.

The study of cancer everywhere provokes universal interest, evidences of which are seen in the increase of the activity of the medical journals devoted to this topic. A recent number of the British Medical Journal was almost exclusively devoted to the subject. There is now published in Germany, under the auspices of the German commission for the study of cancer, a *Zeitschrift für Krebsforschung* devoted exclusively to the subject, of which three numbers have already appeared. It proves to be a journal of great value. Such widespread activity is manifested in these various ways as to indicate the importance of this study to humanity.

In the last annual report I submitted a paper which had to do with applications, especially of the X-ray, in the treatment of cancer. In this paper I took the stand that it was too early to undertake to report results or do anything but gather material and watch. Now, a year later, I hardly feel justified in making any different statement, since while a large amount of material has been gathered and while men have watched eagerly, reports are so confusing and results so variant that it is still difficult to form a judicial estimate of their actual value. Recurrence has taken place in a few of the instances previously reported as cured and the whole question is still *sub judice.* I have had it in mind to summarize in a similar manner the subject of radiotherapy, but here the same confusion prevails. Opinions regarding this subject are discrepant. It is usually those who favor the use of the treatment, or those who have taken it up as a fad, who write the majority of the articles. Men who have been disappointed in its use or who have never become converted to it generally keep silent, and so their views are not heard.

Treatment of superficial growths by liquid air constitutes a method much more tangible, and, in some instances at least, promising. The conditions surrounding the method, however, make it impracticable.

Herewith is submitted a table, arranged by months, of the deaths occurring from cancer in the State of New York as taken from the Monthly Bulletin of the Department of Health. It shows an increase of about five hundred; that is to say, ten per cent, over the total number the previous year. How this figure can be explained on any basis other than actual increase I can not see. Certainly diagnostic methods have not so far improved within the year as to account for any such augmentation as this. It constitutes a rather startling corroboration of the estimate and even the prophecy contained in my first annual report of five years ago. I do not know what stronger argument could be advanced in favor of public assistance for the study of this disease than these figures furnished by disinterested observers.

TABLE I.

December, 1902	458
January, 1903	467
February	422
March	478
April	453
May	429
June	450
July	463
August	470
September	475
October	456
November	415
Total	5,436
For the year ending December 1, 1902	4,984
Increase	452

Below is submitted in Table II, a statement of the expenses of the Laboratory arranged as heretofore.

TABLE II.

Expenses of Conducting the Laboratory for the Period from October, 1902, to October, 1903.

1902.	Equipment.	Stock and material.	Sundry expense.	Salaries.	Total.
October	$100 81	$58 76	$90 15	$728 33	$978 05
November	97 48	195 95	105 54	762 33	1,161 30
December	40 10	95 91	224 48	809 83	1,170 32
1903.					
January	102 51	102 92	119 31	790 33	1,115 07
February	42 63	193 19	396 07	1,040 32	1,672 21
March	208 79	158 41	180 40	873 66	1,421 26
April	36 38	56 82	145 17	873 66	1,112 03
May	9 12	58 93	155 68	873 66	1,097 39
June	49 78	39 51	399 08	873 66	1,362 03
July	179 66	37 14	326 49	706 99	1,250 28
August	2 50	7 04	123 37	694 99	827 90
September	384 02	23 60	27 44	700 04	1,135 10
	$1,253 78	$1,028 18	$2,293 18	$9,727 80	$14,302 94

Of our appropriation of $15,000 for the year 1902-3, $651.32 was used before October 1, 1902, on account of the change in the fiscal year which made it necessary for the previous appropriation to stretch over twenty months; and we had on hand October 1, 1903, $45.74, which accounts for the full $15,000.

With regard to the needs of the Laboratory for the ensuing year, I can only say that it is contemplated to carry on the work about as previously. The appropriation heretofore, i. e., $15,000 per annum, just enables us to do this work, and I would respectfully urge a continuation of the appropriation of the same amount for the continuation of the work during 1904-5. I have observed no falling off in zeal and interest among those engaged in the work; on the contrary, each one connected with the institution has shown such a degree of interest and faithfulness as to be entitled to much public commendation. As before, I have to thank you again for the unfailing assistance which has been constantly rendered from your department and for the numerous evidences of your own personal interest and appreciation of the work done in Buffalo.

ROSWELL PARK.

The Cell-Inclusions in Carcinoma

By Gary N. Calkins, Ph. D., Professor of Invertebrate Zoology, Columbia University, N. Y.; Consulting Biologist State Cancer Laboratory.

It is not my purpose in this report to drag in again the arguments for and against the parasite theory of cancer, nor to dwell upon the lines which such arguments have taken in the past fifteen years. My subject deals rather with the miscellaneous inclusions found in cancer cells and leads me to offer still another contribution to the already crowded literature upon the subject of these much contested structures. I do so not with the hope of saying a conclusive word upon this difficult topic nor of formulating a theory as to the aetiology of cancer, much less of announcing a "new cancer organism," but solely for the purpose of showing how these inclusions may be regarded by a student of cellular biology who has given particular attention to the structures of the cell as they appear in normal tissues and in the lowest animal forms.

It may be pointed out that biologists as a rule have given but scant attention to the cancer inclusions, the majority of them passing over the subject with little thought, or with some evidence of arrogance dismissing without study the characteristic structures as "more like technical artefacts than organisms." There has grown up, however, a great literature on the subject of organisms, especially protozoa, in cancer, most of which, to be candid, is unquestionably based upon a meagre knowledge of these lower forms of life. Assertions and generalizations have been made which not only betoken ignorance of protozoön morphology, but owing to their indefinite nature invite criticism from the biological side on the one hand and scepticism from the pathological side on the other.

The main contention which some writers have held that the inclusions are protozoa has been weakened by false analogies and comparisons and the facility with which such comparisons have been overthrown has discredited the majority of such attempts. On the other hand, a biologist attempting to interpret the varied structures in cancer cells invites the same form of criticism from the pathological side, and basing his conclusions on morphology alone, runs the risk of making equally false and unjustifiable assertions and generalizations. It is with the full conviction of this possibility of error that I offer in the following pages a critical review of the structures which I have independently observed during the time that I have been connected with this Laboratory.

Contrary to what appears to be the usual custom in studying cancer-cell inclusions, I have not examined a large number of tumors in support of any particular hypothesis. On the whole it seemed to me more profitable to study in detail a single case and to be familiar with all of the types of inclusion which that case might present. The advantages of this procedure are: (1) It makes possible the attempt to work out the relations of the different kinds of inclusions, to grade together those which are undoubted degenerations or secretions, and those which may be otherwise interpreted. (2) It presents all of the inclusions under the same conditions of the disease. (3) It permits a deeper analysis in a given time into the structural modifications of the particular type of cancer cells under observation. (4) It gives by reason of this more detailed study a better basis for comparisons with the inclusions in other types of tumor.

Although I have examined many different types of tumor more or less carefully, the one which I have studied in detail is designated as case 300D in the Laboratory records. It was a rapidly growing carcinoma of the breast, operated by Dr. Roswell Park in June, 1903. The report of the pathologist upon it is as follows:

On examination the tumor proves to be a soft solid carcinoma of the breast, in many places showing a distinct cystic character. The larger cystic cavities are lined with multiple layers of large epithelial cells, the nuclei and protoplasm of which stain deeply with haematoxylin-eosin. Karyokinetic figures are fairly frequent. In the smaller nests the membrana propria of the ducts is broken through and nests of epithelial cells can be found in the connective tissue. Many of the canals are filled with solid masses of epithelium. The stroma is well developed and shows a moderate round-celled infiltration. The larger cystic cavities contain a coagulated secretion. In some places the epithelium presents characteristic papillary growths protruding into the lumena of the canals.*

It is the experience of all cytologists that the finer structures of the tissue cell such as centrosomes, spindle fibres, protoplasmic network and the like, can be satisfactorily demonstrated only when the tissue is fixed at once after removal from the body. By such immediate fixation the parts of the cell are set or coagulated by the fixing fluids before they have much time to change. Such changes are indicated in poorly fixed tissues by shrinkage of different parts of the cell and by the impossibility of demonstrating the various structures. Thus the cytoplasm appears shrunken away from the nucleus; the chromatin in the latter disintegrates while the nuclear membrane appears wrinkled and abnormal. In such cells it is practically impossible to demonstrate complete division figures, the spindle-fibres and centrosomes of the mitotic figure being indistinguishable, while the chromosomes are massed together in formless bulk. Conversely a good test of fixation and of stain is the clear demonstration of each of these parts of a dividing cell. If every spindle fibre is clearly defined, if each chromosome stands out sharply and distinctly, and if the centrosomes appear in their proper places as minute deeply-staining points, while in resting cells, if the nuclear membrane appears full and even, with the accompanying cytoplasm free from vacuoles, then the observer will have material from which he may confidently hope to get results.

It is not easy to get this perfect fixation in epithelial cells, but it is far more difficult to get good results in the structural details of the cell-inclusions. Notwithstanding their unicellular nature even protozoa are difficult to fix properly, as any one can testify who has attempted to fix *Amœba proteus* for example, with its pseudopodia extended, yet it can be done by using proper precautions, and it is equally possible to demonstrate structure in the cancer-cell inclusions. In my opinion the so-called "Plimmer's bodies" or "birdseye" inclusions are but poorly fixed bodies, the structures of which are masked because of poor technical methods.

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*Dr. Gaylord.

Every precaution was used in the treatment of case 300D (cf Figs. 34 and 59). Immediately after removal the tumor was brought in a hot box to the laboratory not 100 feet away, and long before the surgical details in the operating room were concluded, it had been cut into small pieces and distributed among several fixing agents. These included the fluids which have been tested by cytologists and recommended for their power of penetration without distortion. Zenker's fluid, Hermann's fluid, sublimate-acetic, picro-acetic and saturated sublimate were used, the best results being given with the first two. Among the stains used were Heidenhain's iron-hæmatoxylin, Delafield's hæmatoxylin, and Feinberg's stain, all of which gave passable results, but none of these was as satisfactory as the Romanowsky stain of polychrome methylene blue and eosin, nor as the magenta, picric-acid and indigo-carmine stain of Borrel (1901).

A. CRITICAL EXAMINATION OF THE CELL-INCLUSIONS.

The interpretation of a given cell-inclusion in carcinoma can be accurately given only by the genetic history of that inclusion. Hypothesis may follow hypothesis regarding it, but until it is followed out stage by stage the inclusion must remain a puzzle. It is fully as important to get the consecutive steps in the formation of a cell-inclusion as it is to get the series of changes in the life history of some unfamiliar animal, and inclusions in carcinoma will be a source of trouble until this is done for every type found.

Many of the inclusions in carcinoma have an encapsuled appearance due to the presence of a more or less thick membrane separating the inclusion from the cell protoplasm. Others are naked in the protoplasm and, if fixation is imperfect, they are apparently suspended in a vacuole. Secretions, degenerations of portions of the cell, metaplasmic products and the like are naked, and so also are intra-cellular parasites in trophic phases. The great membranes or capsules seen in so many cases are in all probability due to the reactions of the cell protoplasm to foreign bodies and not a portion of such foreign bodies, and the problem of such inclusions may be limited to identification of the contents of the capsule. No such capsules appear in the known cases of intra-cellular parasites, possibly because the protoplasmic reaction which produces the capsule is not called into action, possibly because of some emanation from the parasite which prevents its formation, for it may readily be seen that such a wall would be detrimental to the life-processes of a parasite by shutting off the food supply, walling in waste products and the like. So too the capsule which may form around a foreign body not a parasite; e. g., a blood cell, may cause the disintegration of such a contained cell by similarly keeping out food and keeping in waste products. We may state as a general principle regarding cellular parasites that no living parasite while performing its ordinary vegetative functions within a cell host is separated from its source of food supply by a capsule. A capsule may be formed, however, by the animal parasite itself during its reproductive phases, or the reproductive bodies such as spores may be protected temporarily by such capsules, while after the parasite is dead a wall may be built around it by the cytoplasm of the host cell. This capsule about these carcinoma inclusions then may be used as a convenient morphological element for distinguishing certain histogenetic products within a cell from the metaplasmic products of the cell or from intra-cellular parasites. It may define one type of cell-inclusions, while the absence of a capsule may involve further analysis. If the inclusions are cellular in nature, i. e., provided with nucleus and cytoplasm, they might well be regarded as parasites; if colloidal or uniformly granular, or otherwise specifically characterized, they may be regarded as products of the cell. Obviously, so far as demonstrating the parasitic nature is concerned, the capsule furnishes only negative evidence and the real difficulties in interpretation come in distinguishing products of the cell from non-encapsuled invaders.

Applying these considerations to the inclusions in carcinoma we find that this differential is of value in the interpretation of many of the structures observed. We note the presence of the capsule about cells which, despite their positions within other cells, may be more or less easily identified as leucocytes, or lymphocytes, or other tissue cells which in one way or another have come to be intra-cellular foreign bodies. We also find the capsule about inclusions which are not thus easily recognized, which show no indication of an original blood-cell structure, but by reason of the capsule about them we may conclude that they are derivatives of such invading cells. This conclusion for any specific case is strengthened by reason of more or less definite intermediate stages. On the other hand, there are innumerable inclusions which do not show the capsule and which have an entirely different appearance from the original cell-invaders or their derivatives, and which may be interpreted in some other way. The presence or absence of a capsule thus seems to offer a purely artificial but a convenient way of attacking the manifold structures which have been described again and again as the "cell inclusions in carcinoma."

I. THE ENCAPSULED FORMS.

The thickened rim or capsule about this type of cancer-cell inclusions is a good example of a widely spread protoplasmic reaction. A foreign granule under an oyster's mantle causes local irritation and secretion, resulting in the formation of a pearl. Many insect eggs cause local proliferation of vegetable cells and the formation from those of a thickened coating and other similar phenomena will suggest themselves. While these cases are instances of multicellular reactions to foreign objects, the same kind of reaction may occur when objects are introduced into the protoplasm. A notable example is the thickening of endoplasm about the water in a contractile vacuole in amœba, the condensation resulting in the formation of a capsule similar in nature to the ectoplasm which surrounds the entire animal, and like this brought about by the protoplasmic reaction to the water. It is apparent that the wall of the vacuole in amœba is formed by the compression of the alveoli which make up the structure of the protoplasm of the amœba's body, for the diameter of these alveoli decreases from the endoplasm towards the rim of the vacuole where owing to the density the separate alveoli can no longer be made out.

The conditions of the capsule about a carcinoma cell-inclusion are very similar to those of the thickened protoplasm about the contractile vacuole in amœba. There is the same gradation in density from the very dense inner wall turned towards the inclusion to the outer, normal cytoplasm of the cell. Ribbert ('91) called attention to the fact that there appears to be a double contour in this membrane and he interpreted it as a thickening in the surrounding protoplasm, but accounted for it by the supposition that when one cell becomes invaginated into another the cell membrane of the invading cell would appear like a capsule. The capsule according to this interpretation therefore would be a part of the invading cell. Other observers interpret the capsule as a condensation of the protoplasm in the invaded cell. This was Sjöbring's ('90) interpretation and it was accepted and confirmed by Sawtschenko ('95), by Ruffer and Walker ('93) and by many others. Sawtschenko observed that the protoplasm of the invaded cell becomes more and more dense as the membrane is approached until in the membrane itself the protoplasm is homogeneous and clearly defined.

The explanation of these capsules is not clearly apparent unless they may be regarded as the result of a protoplasmic reaction to a certain type of stimulus. It is difficult to see how the invagination of one cell by another can give rise to all of the structures provided with capsules in the cancer cells. Ruffer and Walker ('93) express the view that the invaginated cells, due to rapid growth and pressure in a small space, may take the form of a cigarette within its holder. A section of such a combination would show two circles within a circle. In the case of cells, one of which is invaginated within another, we might similarly find an outer membrane of the invaginated cell and two inner membranes, one within the other, belonging to invaginated cell and invading cell respectively, and we could imagine that the nucleus of the invading cell might be pushed to one side as shown in Fig. 20 while some of the nuclear structures might even be interpreted in this way. The difficulty comes, however, in interpreting the degenerated structures within these capsules. If nothing but pressure induces this invasion, what reason is there for the degeneration of the invader and not of the invaded? The natural supposition would be that it is the latter with its displaced and compressed nucleus in which we should look for ill effects and not in the former. Nor does this theory account for the thickening of the membrane in what may be properly interpreted as inclusions which have been in the invaded cell for some time, nor does it account for the graded density of the plasm which Sawtschenko correctly recognized. While it is not improbable that some of the inclusions found in epithelial cells in carcinoma are invaginations, and that the membranes in such cells may appear like thin capsules, there is reason to believe that this interpretation is too limited to account for all the inclusions with capsules of varying thickness.

Many of the cell-inclusions have no evidence of epithelial cell structure and may be recognized without much difficulty as leucocytes or lymphocytes, etc., and the capsules about them are well-defined and conspicuous (Figs. 2, 3, 5, 19, 20). The possibility of leucocyte invasion is admitted by almost every observer, and it is taken for granted by many that degenerative change of these invaders may give rise to many of the types of cancer-cell inclusions. Sawtschenko ('95) gave a very good review of the possibilities of such changes and described some of the modifications which follow upon invasion. Ribbert attempted to harmonize his theory of invaginating cells with this view by admitting that invagination in some cases might go so far that the invaded cell entirely closes over the invader, and he described the subsequent changes that the imprisoned cell might undergo; most of these, however, apply to the changes which leucocytes or other blood cells undergo and not to invaginating epithelial cells. Klebs ('93) undertook to explain the subsequent changes of invading blood cells on the supposition that they are digested by the epithelial cells which harbor them, and he maintained that many of the structures which other investigators took to be parasites were in reality only stages in the digestion. Without digressing too far to consider this theory, which begs the question of intra-cellular digestion on the part of epithelial cells, it is certainly unquestionable that any cell found within the protoplasm of another cell will, unless it is a parasite and adapted for this particular environment, be unable to continue its own living activities and will die, especially if prevented by a capsule from absorbing food or disposing of waste matters. Kleb's view that the cell is digested seems hardly necessary to account for the disintegration and degeneration which must follow as a natural result from the process of encystment. Whatever the agents are that bring about the degeneration it seems to be a recognized fact that such modifications of leucocytes and lymphocytes take place, and that the products are stored for a longer or shorter time in the protoplasm of the invaded cell.

There is little doubt that a structure like that pictured in Figure 2, is a blood cell included in an epithelial cell, and incased within a capsular membrane derived from the protoplasm of the invaded cell. In these cases the original nature of the invading cells is retained and shows the specific character of the inclusion. The capsules are equally characteristic and are very different from the original cell membrane of leucocyte or lymphocyte.

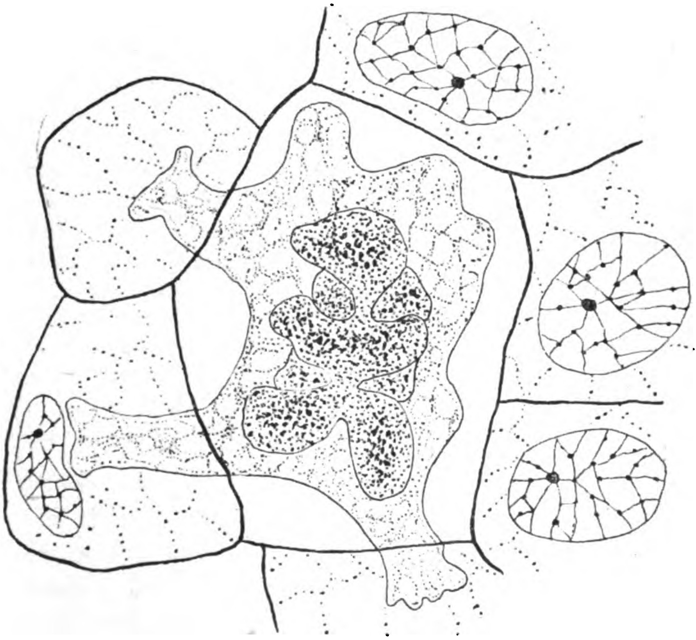
With inclusions of the type represented in Figure 7, the specific nature can not be thus easily recognized and nothing remains except the capsule to aid the identification. This, however, is sufficiently characteristic to warrant the identification as a degenerated blood cell, and the conclusion is strengthened by the study of what are undoubtedly intermediate stages in the disintegration and degeneration of the recognizable blood cells. Here again the capsule plays an important part, for in cases which may be interpreted as later phases of degeneration the capsule appears thicker and denser than in the earlier phases (compare Figures 3 and 6). As Klebs pointed out the first changes which an invading cell undergoes are in the cytoplasm. This becomes "stringy" and incomplete through the appearance of great vacuoles (Figure 19) or it may be drawn out into strands like pseudopodia (Figures 21 and 23) or packed tightly about the yet unchanged nucleus (Figure 2). At a later stage the nucleus becomes modified; its reticular structure disappears, and it becomes compressed into a more or less solid spherical mass of chromatin (Figures 2, 5 and 21). A complete series of these modifications might be obtained without much difficulty from a single cancer, and a few of the characteristic forms assumed are shown in Figures 1 to 7, 16, 17, 19-24, 26 and 38. One important feature is the fact that the cytoplasm of the invading cell does not disappear; that is, it is not digested as Klebs assumed but persists and gives to the body within the capsule an appearance strikingly similar to an amœba, or to a spore of Plasmodiophora within its cyst. The nucleus in such forms varies considerably in size (cf. Figures 21, 22 and 23) and in some cases it apparently breaks up into granules as in Figure 6. Usually it is very much reduced and occasionally appears as a mere fragment of nuclear material within a mass of protoplasm which has no longer even the semblance of a blood cell. Finally this type of inclusion may be traced to structures like those represented by Figures 7 and 24, where hyaline degeneration has resulted in the formation of one or several structureless albuminoid masses with little or no resemblance to the former blood cell.

The earlier writers and observers were inclined to regard these various structures as sporozoa, especially coccidia. This was the interpretation put upon them by Strœbe, by Podwyssotzky and Sawtschenko, by Foa, by Metschnikoff and many others. Some, on the other hand, like Ribbert or Klebs, regarded them as products of degeneration. In addition to these there were still others who were uncertain as to the true significance of these structures, and did not attempt to place them. Among these was Soudakewitch ('92), who declined to place the inclusions, which he was unable to identify as degeneration products, in any group of animals or plants. Less conservative were Heukolom and Sjöbring, who abandoned the notion of coccidia in favor of the microsporidia, claiming that the inclusions are much more like the organism which causes pèbrine in silkworms than like coccidia. Part of Sjöbring's objection to the so-called coccidia of other observers was correctly based upon the fact that the apparent membrane around the supposed organism increases in thickness, and this he could not harmonize with a capsule formed as a cyst, a structure which, in other sporozoa, when once formed does not increase in thickness.

In reviewing the early work on these cancer-cell inclusions one is struck by the fact that the various degenerating cells of this type have played a most important part in filling in the stages in the "life-histories" of supposed parasites. The majority of observers have described forms of all sizes and shapes varying, as a rule, from 3μ to 40μ, the larger ones with solid and homogenous nuclei being almost invariably regarded as the adult form, and as these are usually found in many stages of disintegration, or as the capsule is frequently found with many structures within it, they were not infrequently interpreted as reproductive bodies ("the sporocysts" of many of the early observers cf. Fig. 7). In one case at least (Korotneff, '92) there appears to have been a confusion of large extra-cellular colloidal masses with these cell degenerations and with the minute bodies which subsequently became known as Plimmer's bodies or the "birdseye" inclusions. Korotneff's supposed organism, which he named *Rhopalocephalus carcinomatosus,* was regarded by him as a connecting link between the coccidia and the gregarines, and was endowed by him with characters of zoological as well as pathological importance. This called out immediate criticism from zoologists and pathologists alike, and the result is that Korotneff's "organism" enjoys the empty honor of a mere historical incident.

Before leaving this type of cancer-cell inclusions we must consider another very questionable organism, which, like Korotneff's Rhopalocephalus, is relegated to the waste pile of zoological genera and species. I refer to the remarkable structures which Eisen interpreted as living, independent amœboid organisms, causing carcinoma. I have reproduced one of these structures from Eisen's paper, and have searched for them in the tissues of the cancer which I have studied. It is difficult to prove that the bizarre cell-structures which I have found are identical with those described by Eisen, but as he maintained that the organisms were very common in cancers of this type I think there is no doubt that I have frequently seen what he means by his *Cancriamœba macroglossa* (compare text-figure and my plate II, Fig. 36). A characteristic feature is the "projectile snout" upon which Eisen bases the specific name, and which he regards as a pseudopodium with the specific function of food-getting. This snout, as he believed, presses into an epithelial cell like the suctorial tentacle of an acinetan and gradually digests the protoplasm of the invaded cell. The nucleus of the parasite is described as polymorphous and is frequently seen in the process of segmentation or fragmentation a process which precedes sporulation.

Without going into details upon the subject of Eisen's interpretation of cancerous growths, and their relations to the supposed parasites, I may give



Copy of one of Eisen's figures of "cancrlamoeba macroglossa" to show relative size of cells, "snout" etc.

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a few criticisms of the supposed amœba, criticisms which are meant seriously since it is quite evident that Eisen's work was done in that spirit. The first point that strikes a student of the protozoa is that the protoplasm of the supposed parasite and that of the epithelial cells is almost identical in structure; the characteristic alveoli of amœba-protoplasm are conspicuously absent. As it is a cytophagous form, food vacuoles in which the absorbed protoplasm from the host cells should be digested are always absent; there is no sign of ectoplasmic differentiation, the membrane around the supposed amœba is exactly the same as the membrane of an epithelial cell; contractile vacuoles, while not absolutely necessary for amœbæ, are nevertheless usually present, are entirely wanting in the form under consideration. (Note that in Schaudinn's Leydenia ('96) found in the fluids of peritoneal tumors a contractile vacuole is present.) The nucleus which Eisen fills in with structural detail is entirely different from the nuclei of any species of amœba with which I am familiar, for the characteristic marks of a rhizopod nucleus are large granular masses of chromatin or "chromatin reservoirs" suspended apparently in a nuclear fluid and surrounded by a very definite nuclear membrane. In the cells which I have found in carcinoma and which I regard as the same things that Eisen has described, the nucleus is exactly of the type as those of the surrounding epithelial cells, with the exception that it has lost its definite outline and appears hypertrophied, indented and polymorphic. The chromatin content of the nucleus is very different from that of a rhizopod, for chromatin and limin reticula are readily discernable.

Without attempting to demonstrate the histological significance of this type of structure, which appears to me simply a deformed cell through pressure in the epithelial plug, and undergoing hypertrophic degeneration, I may classify this supposed parasite as another case of mistaken identity which would have been avoided if the author had had a more thorough knowledge of the rhizopod organisms.

Quite a novel interpretation of this type of inclusion was given by Sawtschenko in his later and more important work in 1895. His observations were based upon well hardened and well stained material, and his conclusions regarding the larger cell-inclusions were similar in nature to those of Ribbert and Klebs, who saw in them only the remains of invading cells. Sawtschenko interpreted these inclusions as slimy or colloidal degeneration of cells or parts of cells, but he believed the material so formed to be the food-medium of real parasites of minute size and of varying form. The great majority of inclusions which had been described previously to his work he regarded as merely the scene of activity of the active, living inclusion, which in his earlier paper ('92) he had described as the "tadpole" form. In the later paper these forms were described as present in many different phases and his descriptions are so careful and his drawings so accurate that many of them might well be given to-day as a faithful representation of what is undoubtedly the most important and most interesting type of the cancer-cell inclusions. These inclusions, generally known to-day as Plimmer's bodies, or by von Leyden's term "birdseye" inclusions, have been the subject of contention between the recent advocates of the parasite hypothesis and their opponents. They are the astrospheres and centrosomes of Borrel ('01), the "cancer-parasites" of Bosc ('98), the "Plasmodiophora-like" bodies of Gaylord, the "Histosporidium carcinomatosum" of Feinberg, and the "intra-cellular secretions" of Nósske and Greenough, the Chytridiæ of Behla as well as the yeast-cell types of San Felice and others; in short, the controversy over the cancer-cell inclusions has been sifted down from the larger structures, which are generally recognized as degeneration products, to these minute inclusions first accurately described by Sawtschenko. The general form of the minute inclusions is that of the familiar Plimmer's body, a vacuole with an inclusion, which with inadequate hardening and staining methods appears homogeneous and usually without structure, thus leading to the misconception of the wall of the vacuole as the cell body and the contents as the nucleus of the supposed parasite. Sawtschenko maintained that the thickened capsule has nothing to do with the parasite save the limitation of the immediate environment, and interpreted the capsule inclusion as cell body plus nucleus. There seems to be little doubt that Sawtschenko confused some stages of degenerating blood cells, especially those forms with thickened capsule, with inclusions like the "birdseye" inclusions which should not be thus interpreted. Many of the cell inclusions of this type were observed by him to have no apparent structure, to be hyaline, and of the nature of colloidal degenerations; in short, the end stages of degeneration, and he suggested that such structures might be the degenerated remains of the parasites themselves and a condition to be expected if the inclusions are parasites, some of which might well be expected to succumb to the reactions of the epithelial cells. This keen observer therefore not only did much to clear the field of the speculative rubbish that had accumulated, but paved the way for future interpretations of the structures which are not to be interpreted as degenerating cells and over which the controversy of a cancer parasite must be fought. Before considering this type of inclusions more carefully it will be well to take up from a general point of view the inclusions which may be grouped together as the non-encapsuled inclusions.

2. NON-ENCAPSULED CELL-INCLUSIONS.

Among the inclusions of this type there are many possibilities. We may include under this heading the various oil or fatty products of the cell, local degenerations in cytoplasm or nucleus, metamorphosing products of nuclear origin, and metaplasmic modifications of various kinds as well as any intra-cellular parasites that may be present. The great difficulty obviously is to distinguish one from the other and any possible parasite from all the rest. On first thought this distinction between a possible parasite and products of the cell itself would appear easy to make on the ground that a parasite must be a complete cell with definite body and definite nucleus, whereas a cell product would be homogeneous and structureless. Unfortunately this is not true. Parasites may be present in which the nucleus is not a clearly defined structure of definite form and size but like the nuclear material of many primitive forms, such as bacteria and flagellates, may be distributed in the form of separated granules. On the other hand, normal structures of the cell may be present which, like the yolk nucleus of many egg cells, or the " Nebenkern " of many early sperm cells, or the " Chromidien " of many protozoa, are nuclear in origin and stain like chromatin, although in the cytoplasm. These are the things in short over which the controversy of the parasite in cancer is being waged and it must be admitted that the advocates of the parasite theory have much to contend with. Some of the inclusions, however, are difficult to interpret except on the basis of foreign organisms, and here we come to the necessity of discriminating between the structures which Behla has aptly termed the X-bodies, and the products of degenerating and invading cells. Let us first examine the other non-encapsuled cell-inclusions such as secretions, degenerations and the like.

A great many forms of cancer-cell inclusions appear homogeneous and without evidence of cellular structure, and might well be explained as degenerations of an albuminous nature. These are sometimes found in the cytoplasm and sometimes in the nuclei of epithelial cells, but wherever seen can be readily distinguished from the other inclusions. The possibility of inclusions being merely colloidal degenerations was pointed out by Soudakewitch in 1892, but the type was not emphasized until more recent times when Sawtschenko, Pianese, Fabre-Domergue, Hansemann, Nösske, Greenough and others have called particular attention to this possibility in connection with the contested inclusions.

It was pointed out by Sawtschenko and Pianese in particular that these colloidal matters may be formed from degenerating portions of the cell or nucleus, and figures have been given by each of these observers indicating the consecutive changes which the structures in question may take. The various *intra-nuclear* parasites of Thoma ('89), of Sjöbring ('90), of Soudakewitch ('92) and Ruffer ('93) were regarded as degeneration products of this type and the formation of chromatin masses of spherical form, vacuolization and changes in color reactions of the masses were described in detail. Such degenerations are common in the cancer which I have studied, and the figures of Sawtschenko and Pianese might have been duplicated many times over. They have also been found in the nuclei of skin cells in smallpox and in diphtheria and similar vacuolization and change in color reaction noted. They are, therefore, inclusions which all students of animal tissues are familiar with, and I may pass them over with the description of one or two. At the outset, as it were, of degeneration, these masses are homogeneous and stain uniformly. (Plate 3, Fig. 39.) Later the central part becomes less sensitive to the chromatin or basic dyes and gradually stains with the acid dyes; the peripheral portion of the mass, however, retains its staining capacity for a longer period and a somewhat shell- or capsule-like structure results. Still later the central portion becomes more disintegrated through vacuolization and may ultimately disappear altogether, leaving a hollow shell or a vacuolated or clathrate structure to mark its place inside the nucleus (Figs. 39-42).

In the cytoplasm similar homogeneous masses may also occur through the degeneration of a portion of the cytoplasm or by the degeneration of an invading cell, or possibly by "intra-cellular secretions." Such changes are known as normal processes in many types of cells which can not be correlated in any way with pathological conditions. Thus in the early egg cells of all types of animals where this subject has been investigated the first appearance of the later yolk material is in the vicinity of the cell-nucleus where it lies like a cap about the nuclear membrane. As the "yolk-nucleus" it has been described by many observers, and in all cases the staining reactions indicate that it is of nuclear origin. With growth of the egg this material becomes scattered throughout the cell body and changes in staining reactions. It ultimately becomes transformed into the comparatively large albuminous "yolk-plates" of the mature egg-cell. In secreting cells of many kinds similar nuclear extravasations have been frequently studied, and the process of chemical metamorphosis has been followed through the many grades of the nucleo-albumens from nucleins on the one hand to clear albumens on the other. In the secreting epithelial gland cells, especially those of the breast, it is to be expected that, if the same origin of the secretion is true, there should be masses of more or less albuminous matter stored in the cell body, and that this matter might show undeniable chromatin staining reactions. It would be expected that such masses might even take a uniform nuclear stain indicating a comparatively high percentage of acid content, or an equally uniform cytoplasmic stain indicating a high and predominating albuminous content, while it is equally to be expected that intermediate grades between the two should be frequently met with. Such inclusions are, indeed, common, and I think there can be little doubt that many of the structures which have been described as sporulating forms of coccidia or large gregarines are to be explained upon this supposition. Even the tadpole forms which Sawtschenko described in his earlier paper ('92) bear the evidences of this mode of origin. This type of structure may not be due entirely to secretions, in the epithelial cells with which we are dealing it may indeed be rare, but similar degeneration may take place in the nuclear material of invading cells which are undergoing disintegration. Thus we may account for structures like those represented in Figure 25, where peculiarly constructed bodies recalling Sawtschenko's "tadpole" forms are distributed about the interior of what appears to be the space occupied by an invading cell in aborted mitosis. This type has been interpreted quite often as a sporulating stage of some organism; e. g., by Soudakewitch, Foa, Metschnikoff, Sjöbring and others, an interpretation which Feinberg, without justification, modifies by considering it the "pan-sporoblast" stage of his microsporidian. In the figure referred to above, some of the contained bodies have a nearly uniform nuclear stain, others a uniform cytoplasmic stain, while in still others part stains with the one, part with the other. The forms assumed by the stained portion are frequently tadpole-like and perfectly homogeneous, and are not sharply demarcated from the remainder of the body. It is to be noted that all of this type of structure are characterized by the fact that the parts which stain with chromatin dyes are on the periphery, and in this respect they simulate the intra-nuclear degenerations described above. Ultimately this type of products of the cell take a uniform cytoplasmic stain and have an absolutely homogeneous appearance.

Still another form of inclusion is frequently found which evidently belongs to this type of colloidal products. These are usually much more fluid than those previously described and give the appearance of oils or fats in the cells. Pianese ('96) has shown the modifications which these inclusions may have, and it is possible to duplicate many of the forms pictured by him in the inclusions observed in case 300D. They are usually inclosed in an irregular area of the cell devoid of capsule-like thickening. The individual globules are of irregular size, probably, as Pianese suggests, due to the fusion of two or more. Figure 27 shows such a type and represents the apparent fusion of a smaller with a larger globule.

3. THE X-BODY.

The so-called X-body of Behla does not find a satisfactory explanation under any of the interpretations of degeneration, secretion, or metamorphosis, and in the cancer literature it has been gradually sifted out from the remaining cell-inclusions as a form found only in cancer cells. It is the one type of inclusion which is now generally recognized by friends and enemies of the parasite hypothesis, as the strongest morphological evidence of that theory. It is found in many different phases in the cancer cells of carcinoma, and is the only inclusion in such cells that I have found which in any way justifies the belief on morphological grounds in a possible organism of cancer.

Before giving a review of the previous interpretations of this type of cell-inclusions I would like to describe some of the different forms which it assumes in the cancer which I have been studying. These different forms are so varied and comprise so many different features that at first glance they might be regarded as specifically different things. It is possible, however, to so arrange them that they form a fairly clear and logical set of morphological changes which, if one were so inclined, might be interpreted as growth and reproductive phases of an organism belonging to the unicellular forms. I do not wish to have my meaning misinterpreted in this connection, for there is no positive evidence of a parasite, no sequence in the tissues, and no way to tell, save by possible analogy, that any one stage precedes or follows any other, and to describe in sequence form is partly a matter of convenience, partly to show that such an arrangement is possible, but there is no intention on my part to claim that this sequence in any way establishes the parasitic nature of the inclusions.

In a great many forms of parasitic protozoa the young parasite begins its life as a minute homogeneous spore-like organism with no trace of structure. This is the case in the vaccine organism or young cytoplasmic parasite of the smallpox organism, and the spores of some of the microsporidia which are too small to show the characteristic microspore structures. So in the cancer cells there are minute bodies scarcely a micron in diameter which stain intensely with the specific chromatin dyes (methylene blue, magenta, etc.). These may be the same thing as the so-called Russell's bodies, although I have not observed that they have the characteristic fuchsine reaction which is claimed for these structures and they are much smaller than the forms usually described. They are perfectly homogeneous, sometimes surrounded by a minute vacuole, again with no space about them (Figures 9-10). They are the smallest inclusions that I have seen in cancer cells (less than one micron in diameter), but it is not impossible that still more minute bodies precede these and that more careful technical methods might demonstrate some structure which is certainly not obvious in the preparations as usually made. In slightly larger bodies, equally destitute of membrane or capsule, those for example measuring from 1.5 to 2 microns, there is evidence of differentiation, a minute unstained portion appearing in the body of the inclusion (Figure 10). If we were following the history of an unquestionable organism we should say that the stage following upon the one just described would show a further differentiation of this homogeneous material and that, like a spermatozoon, a portion of the original chromatin-staining substance remains as a nucleus while a peripheral portion forms a more or less clearly defined cytoplasmic or body portion. If this interpretation of these homogeneous bodies were true and if the development proceed as indicated, then the typical Plimmer's bodies might be explained as the immature organism arising from this spore-like germ. It has a definite cell body and a definite cell nucleus, and lies in a characteristic vacuole which always occurs about a foreign body in living protoplasm. In Figure 11 there are two of these forms lying side by side, each is a perfect cell and each is in the form of a minute sphere, measuring 2 and 2.5 microns in diameter. In these particular figures the body of the cell is not drawn out into processes connecting the inclusion with the walls of its vacuole, and this is the usual condition pictured for a typical Plimmer's body (Fig. 8). In the great majority of cases, however, in the preparations which I have studied the inclusion is in connection with the walls of its vacuole by protoplasmic processes which are strikingly like pseudopodia of a myxospore rhizopod-like sporozoon (e. g., Lymphosporidium). The minute bodies are devoid of ectoplasmic modifications and are homogeneous and granular in structure, more dense, however, than the surrounding cytoplasm of the epithelial cell. Occasionally a vacuole is seen in the cytoplasmic portion (Figure 14) but it is not common.

The chromatin-like granule in the center of these small inclusions is perfectly distinct, sharply outlined, and gives an entirely different appearance from the material stained with the chromatin dyes in the types of inclusion described as colloidal degenerations or secretions. It is not a residual color due to the incomplete extraction of the chromatin stain as is the case frequently with colloidal masses or oil-like inclusions, but is a chemically different substance with as definite an outline as a large chromatin granule in the nucleus. This clear definition is retained in all types of the inclusion; sometimes, however, the single granules are replaced by groups of equally distinct granules which may be collected in one group or distributed throughout the small body. With the Romanowsky stain these take the methylene blue, while the minute cell-body takes the eosin; with the Borrel combination the central granule remains red like the chromatin of the epithelial cells, while the cell-body stains green (Figures 12, 14-15, 19, 29, 31, 32, 33, 44-46, 48-51).

The groups of granules are not inconsistent with multiplicative changes in many forms of unicellular organisms. In the rhizopods especially, the nuclear bodies break up into granules by a process called fragmentation; these separate and become the individual nuclei of reproductive bodies. It is therefore a widespread phenomenon of the nucleus and a well-recognized process of division of nuclear material without any of the formalities of mitosis. It sometimes occurs in cases where mitosis is also present, as in *amœba,* where the nuclei divide repeatedly by mitosis until about one hundred are present in the cell, then the chromatin granules in each of the multiple nuclei breaks up spontaneously into small fragments, these escape by rupture of the nuclear membrane, and each fragment forms the nucleus of a spore. These instances serve to show that nuclear fragmentation without a formal process of division is to be expected in the type of organisms to which this cancer cell-inclusion, if it is an organism, may possibly belong. In the small nuclear granule of our form there are no division figures to indicate a mitotic process such as found in the dividing Plasmodiophora for example, but the granules are often seen in an elongated or irregular form, which might be expected in a process of fragmentation. The nucleus-like part of these inclusions is sometimes double, sometimes multiple, but always granular and not homogeneous or diffuse as in colloidal degeneration. The granules are frequently exquisitely minute, so small indeed as to baffle attempt at measurement; the nearest one can get to their size is the general statement that they measure the fraction of a micron, sometimes a large fraction, sometimes small. Whatever the size, however, they are invariably sharply outlined and clearly differentiated. There is never a nuclear membrane, the conditions being similar to the nuclear structures of bacteria or to the protozoon Tetramitus, or Lymphosporidium, or Cytoryctes variolae. Just as in these forms or as in the free non-parasitic types of rhizopods like foraminifera or like the amœba mentioned above the nuclear condition might well justify one in describing this type of inclusion in the cancer cells as a form with its nuclear material in the condition of numerous granular fragments indicating an approaching reproductive process.

It is in this condition of the inclusion, a condition which were we describing a free-living organism might be interpreted as the adult phase, that I have found some of the most interesting and most significant types of the cancer bodies. These are inclusions which give unmistakable evidence of independent protoplasmic movement within the host cells. The most impressive instances of this movement are those cases where the inclusion has been caught as if in the act of migrating from one epithelial cell into another (Figures 13 and 30). In these cases the nuclear material is sometimes in the form of a collection of granules grouped together in a single heap; again the granules are relatively few in number and widely distributed. In Figure 30 the amœboid form is in the act of leaving an intra-vacuolar position in one cell and appears to be penetrating the unaltered protoplasm of an adjacent cell; in Figure 13 a similar condition is pictured, but the connecting strand of material is so thin and delicate that we have the appearance of an indirect division of the inclusion. Indeed this particular case gives the only evidence that I have seen which might be interpreted as a process of division of the inclusion; the chromatin granules are equally distributed and the body is in equal parts. A figure like this, if observed in a free living form like amœba or actinophrys, etc., would be an unquestionable division figure. I have watched the entire process in a minute free form belonging to the genus nuclearia, have seen the pseudopodia drawn in, the appearance of the dividing furrow, the drawing out of the connecting strand of protoplasm and the final break at the center; just prior to the final break the appearance of the two daughter-organisms was strikingly like Figure 13 of the cancer-cell inclusion. It is conceivable that the structure here represented is merely a fragment of a leucocyte and I would be wary of calling it an organism until this possibility is shown to be unfounded.

Still other forms of the inclusions of this type are found in which there is an increase in the number of nuclear granules, each one being separated from all of the rest as in Figures 45, 46, 49 and 50, and occasionally I have found inclusions in which the material is broken up into fragments, each with a chromatin granule in it (Figure 47).

Not only do these inclusions appear in the cell-bodies of the epithelial cells, but they are also occasionally found in the nucleus where they appear to undergo a nuclear metamorphosis similar to that of the cytoplasmic forms. The vacuoles in this case are bounded by chromatin massed to form an apparent membrane which stains with the characteristic nuclear dyes. Several of these intra-nuclear bodies may be traced to metamorphosing chromatin of the nucleus, and there is little or no evidence that they arise by growth of an intra-nuclear spore-like germ. In one case (Figure 28) there are several homogeneous bodies just outside of the nuclear membrane, while two similar bodies are inside of the nucleus and are contained in a vesicle with a delicate wall. Other intra-nuclear forms have the same structure as the majority of the cytoplasmic inclusions, a central or excentric nuclear spot and a differently staining protoplasmic body. In many cases the inclusion appears to be either entering or leaving the nucleus, for the membrane of the latter is deeply indented and the inclusion is partly in and partly outside (Figures 12, 18, 52).

It is quite possible that all of the intra-nuclear forms of the X-body are merely stages in the metamorphosis of the nucleolus as described by Pianese (cf. p. 24). This would explain the chromatin spot and the membrane of chromatin. It might also be argued that the cytoplasmic forms of the X-body are merely the extruded remains of such degenerated nucleoli. The close connection with the nucleus in cases like that pictured in these figures might be cited in support of this theory, but there are so many cases of multiple cytoplasmic bodies, and so many cases where cytoplasmic bodies and nucleoli are both present that the evidence for the theory is outweighed by the evidence against it, while no such theory can account for bodies like those shown in Figures 13, 30, 52, etc.

The large inclusions which had been described up to the time of Sawtschenko, and which have been described by numerous observers since then, were interpreted by him as colloidal degenerations of cells or parts of cells, and a slimy medium was thus formed in which the real cancer-cell parasites found a good feeding ground, and in which they reproduced by the formation of spores of a general sickle-form. The usual inclusions which he described were only once found within the nucleus, the other intra-nuclear bodies which Sjöbring, Soudakewitch and others had laid so much stress on he regarded as degeneration products of the chromatin. His parasites were thought to be more like hæmatozoa than like any other parasitic form and to have a history somewhat similar to the life-stages of the malaria organisms. A nuclear granule was pictured in some forms, a group of such granules in others, while pseudopodial processes formed an irregular peripheral part of the inclusion. The membrane when formed was shown to be a condensation of the surrounding protoplasm of the epithelial cell and no part whatsoever of the organism. It may be seen then that Sawtschenko's observations as to the morphology of the parasite agree very well with the descriptions which I have here given of the

X-body in carcinoma. His material was taken from different kinds of tumors among which were several cases of carcinoma.

There have been many attempts to show that Sawtschenko's "organisms" are products of degeneration, or secretions, or other parts of the normal epithelial cell, but these attempted explanations do not carry conviction, and the failure to find similar things in other diseases, or similarly modified portions of cells in other tissues, goes a long way against such explanation. For the most part these explanations are based upon the possibility of degeneration, or upon some other fanciful change which the cancer cells might mysteriously undergo under the stimulus of unknown toxines or influences of the disease. There is absolutely no doubt that the cancer cells contain inclusions which can be interpreted as degenerations, others as secretions and so on, but in addition to these there are others which can not be disposed of in this way, and these inclusions which Sawtschenko described for the first time, are the forms which remain to be interpreted. An examination of the various attempts to explain them shows the inadequacy of the different interpretations thus far given. Among such attempts we may consider only (1) the astrosphere theory of Borrel; (2) the secretion theory of Nösske and Greenough; (3) the nuclear fragment and chromosome theory of Cornil, Hansemann, Pianese and others.

Borrel's hypothesis has not received much support, nor am I aware that it has been submitted to searching criticism, most observers who deal with the cancer-cell inclusions being content with a simple denial of the possibility. In the early germ cells of the testicles of different animals, especially in many of the vertebrates, the primordial germ cells (spermatogonia) and the maturing germ cells (spermatocytes) have large characteristic structures consisting, as a rule, of several parts, and which are known as the "centrosome" and "sphere" or, all of the structures together, as the "astrosphere." The material of the sphere gives rise in part to the substance of the spindle figure and, when these are present, to the rays passing into the cytoplasm. The centrosomes may in turn have a still smaller internal differentiation the "centriole" and it together with the other sphere substance called the "archoplasm," is supposed to be the center of kinetic activity in the cell. These highly complicated astrospheres are by no means universal in cells and are not easily demonstrable save in germ cells where division is frequent. In epithelial cells they are difficult to make out, although Ballowitz, Heidenheim and Zimmerman have described them in different kinds of epithelium. When present in the cell these spheres are not difficult to stain and are particularly clear and demonstrable when the cells are in active mitosis. At such periods of cellular activity the centrosome and sphere may be seen at the spindle poles, or at the periphery of the daughter nuclei, preparing for the next mitosis. In the resting cells they are conspicuous only in the germ cells or in the spinal ganglion cells of certain animals (dogs, cats, frogs, etc., Rohde). Here they are inclusions with a central spot and an irregular periphery rather sharply marked off from the surrounding cytoplasm but not separated from it by a capsule-like membrane. These astrospheres are the structures which Borrel would compare with the X-body in carcinoma cells, on what justifiable grounds it is difficult to see. Against this view it has been urged that if such structures are normal they would appear in all of the cells while their number would not be increased to twenty or more in any given cell as is sometimes known to happen with the X-body. It seems to me equally plausible to hold the view which Rohde ('03) has recently advanced, that astrospheres in the spinal-ganglia cells are parasites. Both Borrel and Rohde show that the supposed centrosomes divide or else undergo multiple fragmentation to form a group of centers (microcenter) inside of the archoplasmic mass. One (Borrel) interprets the similar division of the central spot of the X-body as equivalent to the fragmentation of the centrosome and regards the central spots as centrosomes. The other (Rohde) holds that the several divisions of the true centrosomes correspond to spores of a parasite. To the former it proves the centrosome nature, to the latter the parasite nature of the central body. To Borrel each part of the cancer-cell inclusion, like the divisions of a centrosome, has the power to form a new centrosome, but each of the divisions of the centrosome forms a new parasite, according to Rohde. To the pathologist the inclusion is a centrosome; to the cytologist, the centrosome is a parasite, and we are justified, I believe, in questioning the advisability of the one on this evidence to enter the field of normal cytology, or of the other to enter the domains of pathology. Borrel's contention can not hold, for the structure in question not only does not have the same history as a centrosome and sphere, but it has no evidence of the structure of this normal part of certain cells, nor is it found at the spindle poles during mitosis, nor at the periphery of the daughter nuclei after mitosis (see Figures 34 and 59). I know of no centrosome or sphere in any normal cell in which there is a like structure, and in cells where astrospheres are formed in large numbers through artificial means, e. g., treatment with magnesium chloride, and which therefore represent abnormal astrospheres of the cell, there is no trace of these peculiar differentiations which are found in the cancer-cell inclusions. In these the artificially created centrosomes and spheres are merely collections of cytoplasmic granules arranged in radiating lines and with a large central granule as centrosome (see Wilson, '02). Borrel's hypothesis then does not stand the test of comparison even with the centrosomes in the spermatocytes of the guinea pig as worked out by Meves, which he takes as his type for comparison, while Rohde's interpretation of centrosomes of this type need not be considered further in this place. It is a gratuitous assumption to hold that the multiple inclusions which are found in many cells in cancer are due to the division of centrosomes, and to explain it we must again draw upon the mystical resources of cancer cells, and to the action of the same unknown toxines that call out degenerations and secretions.

The extremely minute inclusions which have been found in cancer cells and which I have shown in Figures 9 and 10, have been frequently interpreted as minute bits of chromatin or as separated chromosomes. Thus Ruffer and Walker ('93) considered them in this light and agreed with the earlier work of Hauser ('90) in the belief that the so-called Russell's bodies are nothing but portions of the nuclear material which have been derived in one way or another. That there is some good basis for this assumption is indicated by the fact that chromosomes are frequently known to get separated from the nuclei in which they belong and to lead an independent existence in the cell protoplasm. Thus Juel showed that a separated chromosome forms a nucleus of minute size in the cell; it loses its homogeneous appearance in the same way that the chromosomes within the daughter nuclei do, and Juel showed that it forms a reticulate nucleus with chromatin network of the same type as the larger nuclei. Its ultimate fate was not followed. Similar isolated chromosomes have been studied by Boveri and others, and the possibility of such an origin here is not excluded.

Again, the nucleus frequently appears wrinkled and warty and minute protuberances which appear to be on the point of detachment are frequently observed; these are often parts of leucocyte nuclei, the structures par excellence for fragmentation. Figures 57 and 58 show the possibility of such an origin of certain of the minute forms in the cancer cells, and possibly other minute structures, which I can not interpret, may have such an origin (e. g., Figure 37).

Without denying the possibility of such an origin for many of the X-bodies, I do not think that the explanation covers all of them by any means. The origin from a chromosome or from a portion of the resting nucleus might explain the nuclear part of the inclusion, but it fails to indicate the origin of the cytoplasmic part, or the nuclear granulations and the general cell-like structure of the minute inclusions, or of the motile forms as shown in Figures 13 and 30. The inclusions are not like nuclei as described by Juel, but are perfect little cells, each with its minute granular nucleus and alveolar cytoplasm.

Several observers have attributed the X-bodies to secretions in the cell. Pianese, Hansemann, Greenough and Nösske all have a more or less definite conception of the process by which the secreted matter may become hardened or more dense and so give rise to chromatin-like portions. Greenough refers them to specifically modified protoplasm belonging possibly to the cellular structures which Prenant described, and according to whom the protoplasm of a tissue cell contains many kinds of "higher" protoplasm, quite unintelligible to the ordinary cytologist. Nösske interprets the

X-bodies as nothing but vacuoles in the cell which become filled with some kind of inner secretion which is capable of a coagulation process, through which the nucleus-like granules are obtained. In all of these cases there is the same uncertainty of the *modus operandi* in the formation of the questionable body; in each case there appears to be an *a priori* conception of how it might take place, but we search in vain for morphological light on the process. In the meantime the structures are there, definite, clearly differentiated, and of practically the same type, so that they are unmistakable. According to this theory their presence in the nucleus involves that organ of the cell in a new rôle, viz: a "secretion-receptacle," while the unmistakable signs of movement on the part of the inclusions will necessitate a new manifestation of mental agility on the part of the secretionists. My own experience does not enable me to picture secretions in these manifold rôles and in the varied positions, and until more positive evidence is adduced than the literature affords at present, the balance of the evidence must go against this interpretation also.

The X-body thus is not satisfactorily explained as a nuclear product, nor as an astrosphere or secretion. Can it be referred to degeneration products of invading blood cells? The form of the minute inclusion is similar to that of the stage in degeneration where the nucleus is compacted into a homogeneous sphere with cytoplasm in the form of pseudopodia, while the multinucleate condition is duplicated by fragmentation of the nucleus of the degenerated leucocyte. Late stages of the degenerating blood cell may be strikingly like some inclusions which might be mistaken for stages of the X-body. Thus Figure 16 and Figure 17 are very similar, and despite the absence in the latter of the enveloping capsule may be identical in origin. The inclusion shown in Figure 17 is apparently free and resting on two cells, and as it appears under the microscope it is not an intra cytoplasmic structure. This may account for the absence of capsule like that of Figures 16, 23, 38, etc. These are very different things from the more minute and delicate structures shown in Figures 12, 15, 18, 19, 31, 32, 44, etc., and I do not see how the latter can be referred to degenerating blood cells unless, indeed, they are mere fragments of leucocytes; they have no capsules, they are provided with definite chromatin granules and have a well-defined protoplasmic structure. It is an easy way out of a difficulty to say that such things are derived from degenerating tissue elements, and such statements too often given as mere dicta, can not advance the subject in any way.

It is equally unscientific to maintain on the evidence thus far obtained, that these things are parasites. As a working hypothesis, however, it is perfectly legitimate to interpret the various forms of the X-body as organisms quite different from any products of histogenesis. Thus Figures 13 and 30 represent a type of these cell-inclusions which the trained microscopist can not pass over lightly as degeneration products, secretions, or other ordinary cell derivatives. The definite contours, the brightly staining points of chromatin, the evidences of spontaneous movement, all tend to strengthen the hypothesis of a foreign intra-cellular organism. It is conceivable that the structure represented in Figure 13 has been drawn out by division of the cell, and that the connecting strand was not severed after complete separation of the daughter cells, but this seems hardly possible when we consider the age of these cells as shown by the nuclei and cell membranes. The cell plate forming between the daughter cells would certainly have ruptured the delicate connecting strand of the inclusion. The vacuole at the lower end, and the absence of the vacuole at the upper end indicate movement towards the latter.

Notwithstanding the many significant forms assumed by the X-body, I do not yet share the certainty of those who have felt sure enough of the parasite to give it a specific name and a specific systematic position in the animal or vegetable series. The wrecks of *Rhopalocephalus carcinomatosus,* of *Cancriamœba macroglossa,* of Sjöbring's *Strombodes,* indicate the dangers of such attempts, and Feinberg certainly takes great risks in giving to the X-body the specific name of *Histosporidium carcinomatosum.* Even though the X-body were an undoubted organism, which, by the way, is not evidenced in any degree by Feinberg's descriptions, there is absolutely no structural or ontogenetic evidence to justify its position as a sporozoon. There is not enough structural evidence even to place it definitely as plant or as animal and such attempts are premature. If on the evidence thus far advanced we were inclined to indicate relationship of the possible parasite, we would, with Behla, place it with the Chytridiaceæ, or with some other similar group intermediate between the lower plants and protozoa. Even were it proved to be an organism it could be accurately placed only after knowledge of the full life history, and the evidence even for simple reproduction by spore-formation, the possibility of which is barely indicated by structures similar to that represented by Figure 47, is not yet forthcoming. The difficulties of the problem make it the more fascinating, and the parasite hypothesis should not be deprecated or neglected because of the hasty conclusions which some of the advocates of that hypothesis have published. I am much more favorably impressed with the breadth of view of Borrel which prompts him to say: "The criticism which I have just made against the attempts to explain these inclusions as sporozoa should not prevent further research along the lines of this seductive hypothesis" (op. cit. '01, page 60), than with the dogmatism of Marchand when he says: "Since the theoretical considerations are totally opposed to the probability, and indeed the possibility, of a parasitic origin of carcinoma and other malignant neoplasms, and since all cell-inclusions which have been described as parasites are not such but are products of the cell itself, it is high time that pointless research for a carcinoma parasite should be given up and the cause of the malignant growth sought for in other ways."* Even though a specific parasite in carcinoma on *a priori* grounds seems untenable to some, the possibility that such is the case is at least conceivable, and this line of attack should not be neglected until the ætiology of cancer is established. But the *a priori* arguments which have been given are not sufficient to show that this theory is untenable, and the opponents of the theory do not take into consideration all of the possibilities of activity of living foreign inclusions.

Protozoa, like the bacteria, produce substances as products of their metabolic activity which are poisonous to their hosts, and give rise to malignant diseases. Malaria, smallpox, scarlet fever and the several types of disease caused by different species of the genus Trypanosoma owe their morbid effects to toxines of this cellular origin, and these affect the host in various ways, sometimes only physiologically, sometimes both physiologically and morphologically. The specific effect produced in carcinoma is the increased activity of cell division in epithelial cells leading to proliferation of these cells, to abnormal structures and to invasion along the lines of least resistance. The usual response of a lower animal to the intercellular protozoon parasite is the formation of an enveloping sheath or cyst due to accumulation of the connective tissue and called out by stimulus of the parasite. In some cases, however, there is a stimulus to division of the epithelial cells and unusual proliferation in the vicinity of the infection. Thus Thelohan, Hofer and Doflein emphasize the fact that Myxobolus-infection in fish results in the unusual proliferation of the muscle-cells; Leuckart called attention to the epithelial proliferation in Coccidia-infected rabbits, an observation which Tyzzer ('02) has recently confirmed. In vegetable protoplasms the effect of *Plasmodiophora brassicæ* upon plant tissue is the active proliferation of cells and the formation of great deformities in the roots. Proliferation therefore is a general phenomenon attendant on the presence of protozoon parasites.

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*Quoted from abstract in Centralbl. of Bakt. Par. 1903.

The objection has been raised that the supposed parasites in carcinoma are so few in number that they are totally inadequate to account for the active increase of the epithelium, and as a counter-proposition it has been urged, especially by Cohnheim, that the invading epithelium is a reserve of embryonic cells which have lain quiet in the body until the proper conditions bring out the latent energy and cause them to rapidly divide like young cells. I am not competent to discuss this theory, nor to criticize it from the embryological point of view, and for this reason the fact that it seems to me farfetched and improbable, will carry little weight. I am more at home in criticizing the recent view of Ribbert ('01), who makes the objection that if parasites are the cause of cancer they must have the very novel power of changing the entire nature of epithelial cells; that is, of generalizing them and of making them more perfect cells instead of more disabled cells, or that the parasites instead of exerting a harmful effect upon the cells they infest produce a beneficial effect. A satisfactory response to this kind of argument was made by R. Hertwig (1900), who called attention to the fact that cancer cells instead of being perfect or embryonic in nature, are actually the reverse and show unmistakable signs of senile degeneration. He called attention to the fact that in protozoa (Actinosphærium) after a long period of rapid asexual reproduction the cells become hypertrophied and abnormal in structure; the nuclei are much enlarged and show characteristic morphological changes which are due to protoplasmic senility. The fact that such changes are frequent in cultures of protozoa which have been kept from sexual reproduction for long periods has been known for many years, and old age in these single cells is a well-known phenomenon since Maupas' classical researches in 1888 and 1889. Hertwig's contention is that abnormal epithelial growths do not occur in the young human tissues, but make their appearance after cell-proliferation has become less active. In such cancer cells, the abnormal growth is a sign, not of youth with its well-balanced self-regulation which prohibits abnormalities, but of senility in which the self-regulating power so characteristic of all living things has been lost. Secondary evidences of this degeneration are shown by the hypertrophied nucleus, frequent amitoses and loss of the specific characteristics of the tissue involved. The problem of the ætiology of cancer deals with the direct cause of this special increase of the dividing energy of cancer cells.

An epithelial cell in an adult human being represents the Nth generation of cells since the first cleavage of the egg, and just as we are justified in saying that the 319th generation of Stylonychia pustulata, or the 200th generation of Paramœcium caudatum represent the limits of dividing energy of these two organisms, so we may say that the Nth generation of any tissue cells represents the limit of dividing energy in these human cells. In the case of Paramœcium, however, it has been shown that the waning energy may be renewed by artificial means, and that the addition of a little salt (potassium phosphate) to the medium in which they live for the short period of thirty minutes, was sufficient to stimulate the worn-out cells to a renewed activity, and instead of dying like the organisms not thus treated they divided about 200 times more. This process was repeated again and again until the race finally succumbed in the 742d generation (see Calkins '04). The dividing power of the worn-out cells of an epithelium is capable of similar reinvigoration, even after the limits of growth have been attained, and renewed proliferation may take place in functional epithelium, giving rise to abnormal growths which have been explained without calling upon improbable and inexplicable embryonic tissues.

The stimulus to the renewal of the dividing activity of an epithelial cell in the case of carcinoma may very well come from the inclusions, notwithstanding the relatively small numbers present. Owing to the small size of these inclusions I am inclined to think that they are frequently overlooked, and that their scarcity is somewhat traditional. I have found them in abundance in a rapidly growing carcinoma where they are supposed to be less numerous than in the older, more slowly-growing types. If the analogy with the worn-out race of Paramœcium holds good for the epithelial cells, then would it be unnecessary to have a parasite for each cell as Ribbert assumes; a single stimulated cell, if reacting like Paramœcium, would divide again and again after stimulation, and the effects of the parasite would be a Fernwirkung in a new sense.

In a certain sense the stimulus which a parasite might thus produce is not unlike the action of a spermatozoon in the egg. In relative volume to the egg cell the male cell is no greater than the relative volume of the X-body to the epithelial cell, and yet it produces the wonderful result of development. Its action has been interpreted as an effect of enzymes, and in support of this explanation the work of Loeb and others on artificial parthenogenesis has been cited. The same effect as that of a spermatozoon has been produced by a minute quantity of magnesium chloride, and the stimulus has thus been given for the egg to divide again and again, while self-regulation and differentiation work together to mold the cell progeny into the form and structure of the organism. Here then is the temporary action of a foreign substance upon living protoplasm, the effects of which are felt long after the direct contact, and another instance of this special type of Fernwirkung.

If a toxine of this type is at work in carcinoma it would not be unreasonable to assume that a certain optimum is necessary to produce the stimulating effect; if this optimum is exceeded, growth may be retarded; if the proper amount is not present the effects will be nil. In the experiments with Paramœcium I found that a certain quantity of salt and a certain time of its action were necessary for successful results, and the same experience has been met with by all who have attempted to induce artificial parthenogenesis in eggs. This may be one explanation of the slow growth of cancers in which the number of the X-bodies in the epithelial cells is relatively large. Upon such an hypothesis it may be seen that while possible carcinoma parasites have no such effect as the smallpox organisms for example, such parasites might be quite sufficient to stimulate cell development and tumor formation while the ensuing morbidity and ultimate cachexia might well be traced to general poisoning due to a disordered system and not directly referable to the parasites themselves.

SUMMARY.

1. There are two main groups of inclusions in carcinoma, those which are encapsuled, and those without capsules.

2. Encapsuled inclusions appear under several forms, sometimes definitely cellular in which case they are recognizable as blood cells or epithelial cells, sometimes variously modified by degenerative changes and unrecognizable.

3. The various modifications of such inclusions have been variously and erroneously interpreted as stages in the life history of protozoan parasites.

4. Attention is directed to the fact that parasites in cell-protoplasm can not get food nor rid themselves of waste products when enclosed in capsules.

5. The same principle may account for the degeneration of encapsuled invading cells such as leucocytes, lymphocytes, etc.

6. Capsules or cysts around parasites are formed not by the host cells but by the parasites at periods of reproduction or for protection

of spores, etc. Capsules around cell-inclusions in carcinoma are formed by the protoplasm of the invaded cells.

7. Non-encapsuled inclusions in the form of secretions, degenerations, metaplasmic modifications, etc., are likewise present in cancer cells. These must be correctly interpreted before any parasite hypothesis is advanced.

8. The X-body of Behla is not satisfactorily explained as metaplasmic, degeneration or secretion product, although it is not yet known to be independent from blood-cell origin. It appears without a capsule but lies in a vacuole in the cytoplasm or nucleus. It possesses a granule or granules which take up the chromatin dyes with marked intensity. In some cases it shows strong evidence of spontaneous movement.

9. Theoretical considerations are not entirely sufficient to outweigh the morphological evidences of an organism. The small number of inclusions indicates that no such results are to be expected as those which follow the presence of masses of parasites as in smallpox or scarlet fever, or malaria, but experimental results show that great proliferating stimuli may be given by minute quantities of poison, and *a priori,* grounds are thus obtained to justify the effect, in this case a tumor, through the activity of a relatively few parasites.

10. The proliferating epithelial cells of carcinoma do not show the characteristic of embryonic cells, but rather of senile degenerate cells as shown by cell and nuclear hypertrophy, and by loss of the self-regulating power which is particularly characteristic of young or embryonic cells.

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DESCRIPTION OF PLATES.

All figures are drawn with the camera with lens system of ocular No. 6 Zeiss and Objective 1.5 Zeiss. Magnification about 1,800 diam. All inclusions represented are from one case of carcinoma.

Plate I.

Fig. 1. A cell-inclusion of unknown origin but probably a degenerating epithelial cell.

Fig. 2. Epithelial cell with invaded blood cell (lymphocyte).

Fig. 3. Cytoplasmic degeneration beginning in invading leucocyte. The nucleus of the invader is not yet affected.

Fig. 4. Degenerating lymph cell in which no trace of cytoplasm remains.

Fig. 5. Further stage in the degeneration of blood cell. The chromatin of the nucleus is massed, although not so densely as in the preceding figure.

Fig. 6. Late stage of nuclear metamorphosis of an invading blood cell. The thickness of the capsular rim is characteristic of the inclusions in this stage.

Fig. 7. Colloidal masses in a vacuole with capsule, representing possibly, the end phase of degeneration of an invading cell.

Fig. 8. A "Plimmer's body" consisting of vacuole, central spot and rim. Indicating no differentiated granules like those of the X-body.

Fig. 9. Homogeneous spot of foreign substance in cytoplasm, characteristic of many inclusions in the epithelial cells.

Fig. 10. Similar body somewhat larger, with a characteristic vacuole.

Fig. 11. Two "Plimmer's bodies" with central, differentiated spot.

Fig. 12. The X-body of Behla, indenting the nuclear membrane, and with highly characteristic form including pseudopodial processes which may be traced to the periphery of the vacuole, and an internal differently staining spot which is always sharp and clearly defined.

Fig. 13. A form of the X-body which was seen only two or three times. It stretches between two adjacent cells and each enlarged end contains three distinct spots which take the chromatin dyes.

Figs. 14 and 15. Two characteristic X-bodies.

Figs. 16 and 17. Two similar amœboid masses with definite granular masses of chromatin-like substance. One has a capsule, the other has none. These cannot be organisms but their origin is not made out.

Fig. 18. An X-body partly embedded in the polymorphic nucleus of an epithelial cell.

Plate II.

Fig. 19. Epithelial cell with leucocyte invader, and minute X-body of characteristic form and content.

Figs. 20 and 21. Two stages in the degeneration of an inclosed blood cell. In the latter the nucleus is becoming homogeneous and contracted through the loss of nuclear fluids.

Figs. 22 and 23. Two later stages in the degeneration of invading blood cells. The compact nucleus is much reduced in size and the cytoplasm appears broken.

Fig. 24. Last remains of what is apparently the end stage in degeneration of the inclosed cell; nothing is present but a homogeneous central dot, while the remainder of the cavity inside the capsule is flocculent and unformed.

Fig. 25. A figure representing a late stage in the degeneration of a cell with chromosomes. These are the "tadpole" forms described by Sawtschenko and interpreted as parasites in the slime formed by a degenerating cell.

Fig. 26. A cell with nucleus broken into many fragments which appear uniform in size and characteristic enough to be regarded by many as stages in the reproduction of a parasite.

Fig. 27. Fat-like particles in an epithelial cell showing fusion of droplets.

Fig. 28. Nucleus of epithelial cell with several questionable bodies in the cytoplasm and one similar body in the nucleus. Suggested as a possible early phase of the intra-nuclear X-body.

Figs. 29-33. Various phases of the X-body. In the last two the chromatin material is in the form of minute granules resembling the nuclear conditions of many lower forms. In figure 30 the X-body has the form of an amœboid organism apparently in the process of migrating from the vacuole into an adjacent epithelial cell. It is very difficult to interpret this form as a degeneration product or portion of a leucocyte. The chromatin material is in four separated granules, one at each end of a pseudopodia-like process.

Fig. 34. A stage in the anaphase of mitosis showing chromosomes and spindle fibres but with no trace of the X-body at the poles as would be expected were Borrel's centrosome-hypothesis correct.

Fig. 35. An intra-nuclear X-body with typical structure.

Fig. 36. An enlarged epithelial cell with hypertrophied nucleus and curious neck-like process; a type of cell which was supposed by Eisen to be a specific parasite of cancer and named by him "Cancriamœba macroglossa."

Fig. 37. A cell with a minute inclusion of unknown origin. The appearance of the minute elements within the vacuole suggests that it is derived from a misplaced chromosome, but not enough stages were observed to warrant this interpretation.

Plate III.

Fig. 38. A stage which is difficult to interpret without comparison with the earlier and similar figures. It represents a rather late stage in the degeneration of an invading cell with the compact nucleus undergoing secondary vacuolization preparatory to the formation of numerous granules as represented in figure 6.

Figs. 39-42. Stages in the metamorphosis of the "nucleolus" of epithelial cells, showing the hollow sphere, the reticulated nucleolar body (figure 40, compare with this figures 53 and 54) the clathrate body and the degenerate visicular body with change in color reaction.

Fig. 43. A stage analogous to that of figure 24.

Figs. 44, 45, 46. Various stages to show the nature of the chromatin in the X-body in the form of separated granules, sometimes of small size, sometimes large.

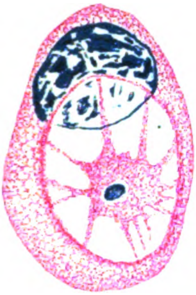
Fig. 47. An interesting stage suggestive of reproductive process in some single-celled organisms. Each chromatin granule has its separate bit of cytoplasm.

Figs. 48-52. Similar types frequently found in this cancer.

Figs. 53-56. Characteristic intra-nuclear forms which are identical in structure to the X-bodies in the cytoplasm. Possibly to be identified as degenerations of the nucleols as shown in figure 40. Figure 56 is a curous structure which were it not isolated, might suggest a stage in merozoite-formation of a coccidium, but is probably only a particular type of nuclear degeneration.

Figs. 57 and 58. Two nuclei with buds showing the possible mode or origin of structures like those shown in figure 10, etc.

Fig. 59. Another mitotic figure in the metaphase stage showing that the spindle-poles, although provided with centrosomes have no trace of astrospheres.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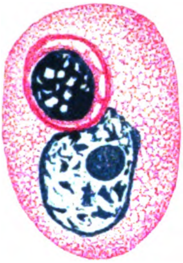
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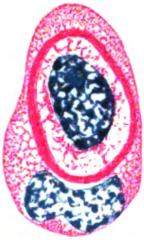
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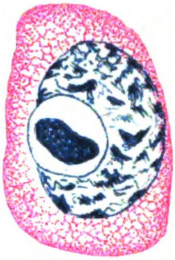
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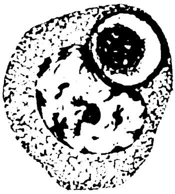
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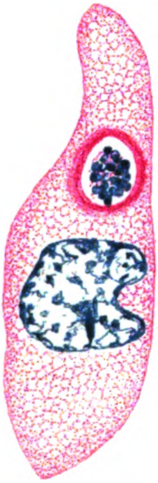
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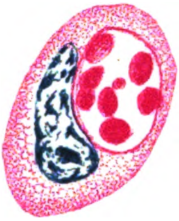
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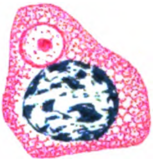
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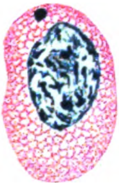
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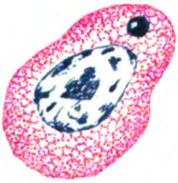
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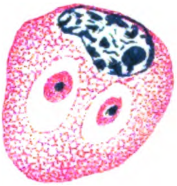
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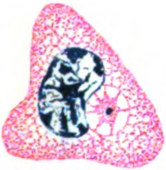
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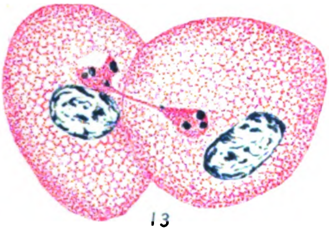
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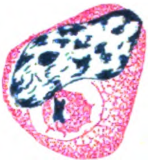
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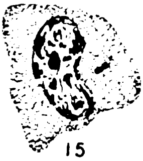
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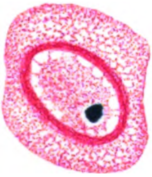
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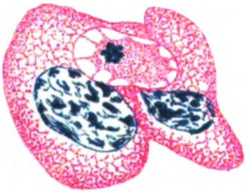
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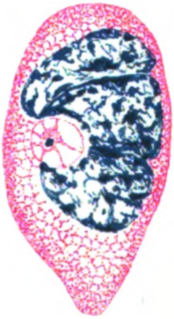
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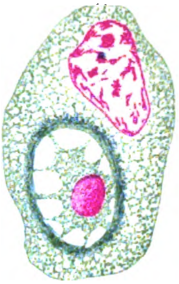
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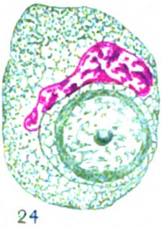
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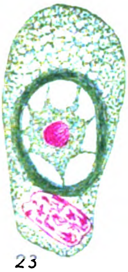
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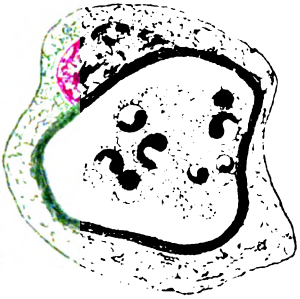
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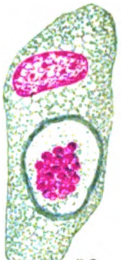
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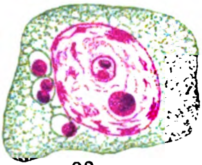
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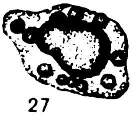
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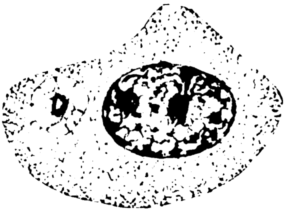
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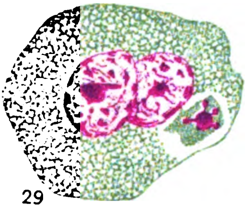
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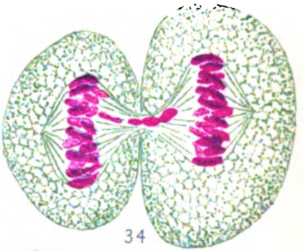
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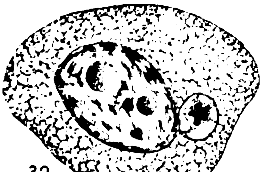
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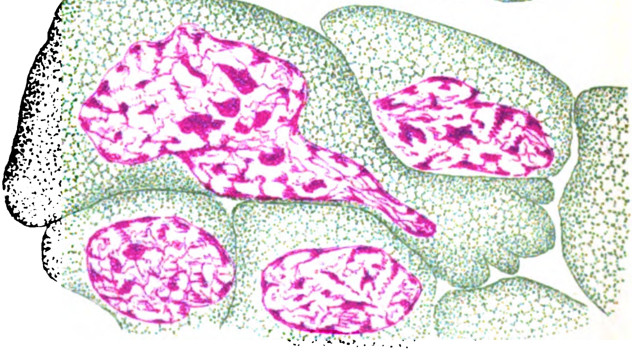
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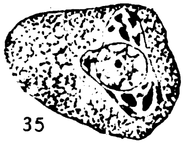
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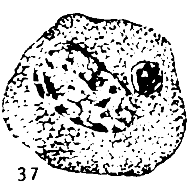
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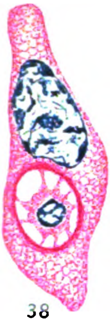
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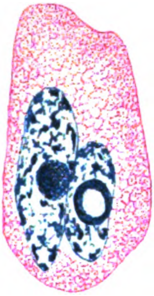
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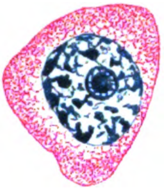
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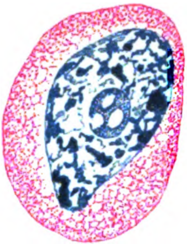
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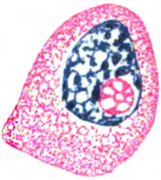
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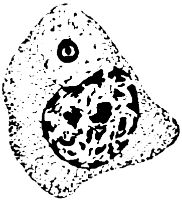
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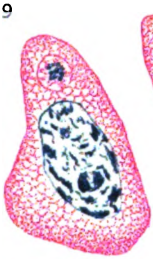
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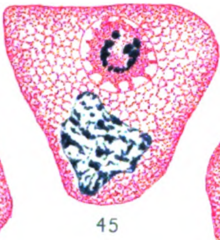
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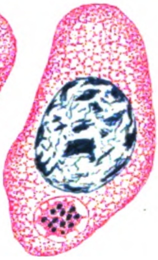
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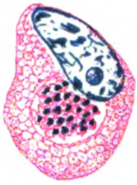
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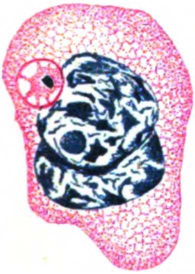
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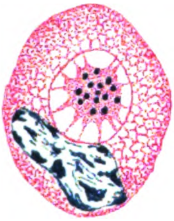
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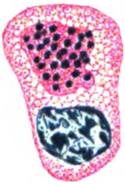
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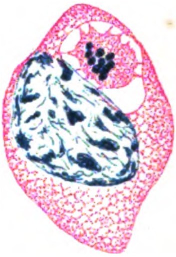
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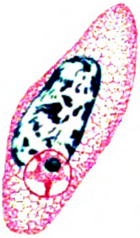
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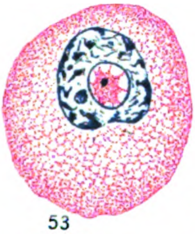
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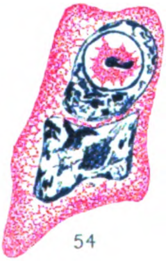
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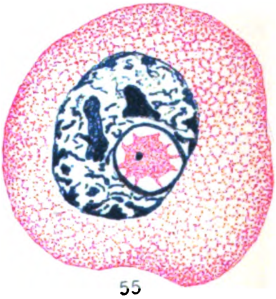
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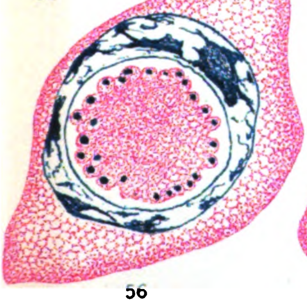
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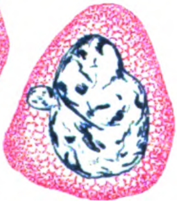
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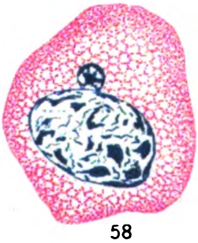
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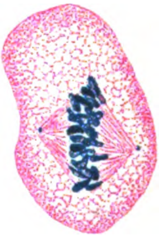
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On the Analogy Between Smallpox and Cancer.

By H. R. Gaylord, M. D.

The idea that certain points of similarity exist between the cancerous process and the acute exanthemata, especially smallpox, is by no means new. Attention has been called to the subject from two entirely different points of view, both, however, having as their basis the infectious nature of cancer. Those who have been engaged in the study of the cell-inclusions of cancer and vaccine and find in these inclusions certain points of resemblance were the first to call attention to the analogy existing between the two problems. The second point of view is as yet represented by Borrel, who has recently attempted to show that without regard to the question of the inclusions (which he views as often characteristic of the process but not as parasites), certain points of similarity can be traced which lead him to the conclusion that although the nature of the agent is as yet undiscovered, both the epithelioses and epithelioma are infectious and may be said to possess a virus which is capable of transmitting the disease. He supposes the existence of a cancer virus, which is suggested to him by results recently obtained in the transplantation of epitheliomata in mice. Regarding the similarity of the virus found in smallpox and the virus obtained in sheep-pox (clavelée), Borrel brings many points of interest, especially certain experiments with the latter which is found to pass through coarser grades of the Chamberlain filter but not through the finest.

Without entering here into the details of Borrel's research, to which we shall later have to refer, we may say that he favors the idea that in both cancer and smallpox the infective agent is a minute, if not invisible parasite, and that the inclusions are the result of degenerative changes in the protoplasm or of invaginated leucocytes in process of disintegration. He finds in sheep-pox a characteristic inclusion in the cytoplasm of the epithelial cells, and in an epithelioma of the mouse which he used for transplantation, similar inclusions. The inclusions found in the corneal epithelium of the rabbit after inoculation with vaccine, he believes with Salkowski, can be reproduced by irritants such as diphtheria toxin, or superheated vaccine.

In the light of the recent work of Councilman, Brinckerhoff and Macgrath, and the elucidation and confirmation which their work on vaccine and smallpox has found at the hands of Calkins, it would be profitable to recall the points of resemblance which may be traced between cancer and these processes on the basis of the inclusions found in both.

The first author who especially called attention to the similarity of appearance between certain forms of the so-called vaccine body or Cytoryctes vaccinæ (Guarnieri) was Gorini.* This author pointed out that in inoculated corneæ certain larger forms of the vaccine body were frequently surrounded by a form of capsule, and that they then closely resembled the cell-inclusions of cancer. The forms in question in vaccine had been described previously by L. Pfeiffer, Guarnieri and Clarke and were interpreted by these authors as a more advanced stage of development of the smaller and characteristic vaccine body. A gradual transition between the typical vaccine body and these larger inclusions could be traced by Gorini, who concluded that they are developed from the smaller inclusions. These larger bodies he finds possess a high degree of similarity in form and appearance to the cell inclusions of cancer.

In 1900 we were led to conclude that the inclusions of cancer and those of vaccine were essential in their nature, although not identical, and reinforced by the publication of Wasielewski† who, to our mind

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*Gorini. Centralbl. f. Bakteriologie Abt. I, Vol. 28, 1900.

†The conclusions of Wasielewski are so important that it is not out of place here to give them in full:

Contribution to Our Knowledge of the Nature of Vaccine.—Von Wasielewski Zeitschrift für Hygiene, Vol. XXXVIII, Part 2, October, 1901.

"*Conclusions.* The vaccine bodies are the single characteristic structures which are found in the epithelial cells of the skin and mucous membrane brought all but convincing proof of the parasitic nature of the Cytoryctes vaccinæ, we arrived at the conclusion that the conditions surrounding both problems were identical and that if the inclusions in vaccine were parasites, the inclusions in cancer were likewise parasites.

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in vaccine and variola. These are absent in normal epithelial cells of the skin and under all other conditions. The bacteria described as the specific factors in vaccine are saprophytes and have no etiological significance as shown by the efficiency of lymph entirely free from bacteria.

"2. The characteristic vaccine bodies invariably appear in the corneal epithelium of rabbits inoculated with potent vaccine.

"3. The same structures can not be induced in the epithelial cells of the cornea in rabbits in any other way.

"4. It is impossible that the vaccine bodies are leucocytes or degeneration products of leucocytes.

"5. The derivation of these bodies from the nuclei of the epithelial cells is disproven by, first, their appearance in perfectly normal cells; second, their presence in cells which are undergoing mitosis; third, by the appearance of the smallest of these bodies at the periphery of the lesion, where they make their first appearance in the peripheries of the cells most widely distant from the nuclei.

"6. The origin of these bodies from the cell protoplasm as the result of the specific action of an organism supposedly invisible because of its minuteness, can not be proven or entirely disproven but is rendered throughout improbable on the following grounds: *a.* Because the specific factor of vaccine can be removed by filtration for which reason there is no ground for supposing it to be an infinitely minute organism. *b.* Because the vaccine bodies appear in cells undergoing division in which the karyokinetic figures show the characteristic protoplasmic radiation and the figures themselves are derived from the central portion of the cytoplasm, which according to the views of Hueckel is first affected by the specific action of vaccine. *c.* Because a similar specific transformation involving alone special portions of the protoplasm has never been proven in any other case. *d.* Because the extensive and rapid appearance of degeneration and vacuole formation as that of the granulated degeneration of the vaccine bodies has never been observed in any of the degeneration processes of the protoplasm, because the development of such characteristic cell-inclusions can not be compared with any known form of cellular degeneration. *e.* Because the impotent filtrate of vaccine lymph has no specific toxin action upon the epithelium.

"7. Size, form and structure, distribution and extension at the point of inoculation, as well as the appearance of evidences of division and degenera-

Our analogy extended likewise to the examination of fresh material in which we found certain hyaline bodies which we compared to the so-called fresh vaccine body.

On the same date of the same year Bosc* published an article advancing exactly the same idea but including sheep-pox, a disease which we had not been able to study. Bosc went so far as to classify these diseases and believes that they form a group of sporozoan infections. Bosc gives an exhaustive description of sheep-pox, the virus of which causes epithelial lesions and connective tissue nodules in the subcutaneous tissues. In the exudate obtained from fresh postules he found characteristic epithelial cells containing highly refractive bodies embedded in the protoplasm and similar free bodies, many very small, which presented characteristics similar to the inclusions in the cells. He finds that some of the inclusions and free bodies take the nuclear stain, although irregularly. In

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tion forms, speak for the supposition of Guarnieri that the vaccine bodies are parasites (schmarotzi) within the cells.

"8. The changes which the presence of the vaccine bodies induce in the cells support this view.

"9. The propagation of vaccine through forty-eight generations by inoculation on the cornea of rabbits proves that an active continuous proliferation of the vaccine bodies occurs at the site of inoculation.

"10. That, besides the vaccine bodies at the point of inoculation, no other organisms are either microscopically or bacteriologically demonstrable, and the constant reappearance of the vaccine bodies to the forty-eighth generation is demonstrable."

The author concludes that the supposition of Guarnieri that the vaccine body is the vaccine organism must be viewed as extremely probable.

The importance which we attached to Wasielewski's work and our point of view is shown by the following paragraph taken from the manuscript of an address given by us in Detroit February 21, 1902, before the Wayne County Medical Society: "It is manifestly impossible to apply all of these conclusions to the organisms of cancer, inasmuch as the experimental basis in cancer is infinitely more limited, but by a realization of the intrinsic nature of the two problems, it may readily be seen that the definite establishment of the vaccine body as the vaccine organism places us a great step forward in an appreciation of the true significance of these characteristic cell-inclusions in cancer."

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*Bosc. Archives de Medecine Experimentale. Vol. XIII, No.3. May, 1901.

many, however, the central portion of the body takes a chromatic stain. Similar inclusions are to be found in the cells forming the connective tissue nodules. *The inclusions vary in size from bodies not larger than a micrococcus to large structures either spherical or of irregular form with a more refractive central body.* All the inclusions are surrounded by a more or less clearly defined zone of clear protoplasm. Bosc inoculated the cornea in a number of sheep and obtained a lesion similar to that of vaccine, the inclusions being very abundant by the sixth day. As controls he inoculated the cornea with pathogenic bacteria, fungi, dust and *superheated sheep virus.* In no case were inclusions formed which could be compared to the inclusions following inoculation with the fresh virus.

Without going further into the details of Bosc's paper, to which the reader is referred, it may be seen that he definitely establishes the presence of characteristic inclusions and shows that in this connection the virus is similar to that of vaccine. Neither Wasielewski nor Borrel describes intranuclear inclusions in vaccine or smallpox, but Bosc* has since published a paper on the parasite of variola which appeared the 24th of October, 1903, describing practically all the forms observed by Councilman. His paper, although appearing several months after Councilman's preliminary announcement, affords an independent observation of these structures. Thus far in sheep-pox no intranuclear forms have been observed.

The only reference to nuclear inclusions in vaccine, which in the light of Councilman's work receives a renewed interest, is that of Gorini.† Gorini found that certain forms of the Cytoryctes vaccinæ could be found within the nuclei of the epithelial cells of the inoculated cornea, and that many of the inclusions were so placed in relation to the nucleus that they must be looked upon as either penetrating or being cast off from the nucleus. Many of the intranuclear inclusions are of the larger variety; i. e., those already referred to as closely resembling the inclusions of cancer. Gorini concluded that either the Cytoryctes is a parasite which infects the nucleus and in many cases passes then to the protoplasm (or the reverse), or that the Cytoryctes is not a parasite but is a characteristic body derived from the nucleus. Which of these hypotheses he favors Gorini does not state.

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*Bosc. Comptes rendus des Séances de la Société de Biologie T. LV. p. 1204.

†Gorini. Centralblatt f. Bakteriologie. Abt. I. Vol. 29, 1901.

The presence of typical birdseye inclusions within the nuclei in cancer was first noted by Steinhaus.* A simple reference to his illustrations clearly defines this point. Plimmer† likewise found the same inclusions in nuclei and gave an illustration representing this phase. Their presence has also been noted, described and illustrated by Apolant and Embden, who in contradistinction to the above-mentioned authors, who held them to be parasites, believed that many of the birdseye inclusions are derived from the nucleus as the result of degenerative changes. In fact, Apolant and Embden believe that the birdseye inclusions in the protoplasm and the birdseye inclusions in the nuclei are produced by different processes and can not argee with Nösske that the only source of the inclusions is the degenerated protoplasm. This criticism applies to Greenough, who preceded Nösske in attributing these inclusions to secretive processes in the protoplasm. The presence of inclusions in the nucleus likewise diminishes the value of such experiments as those made under Aschoff's direction by Spirlas, in which the introduction of foreign cells into the peritoneum of animals leads to the formation of inclusions in their leucocytes which present a similarity to birdseye inclusions. These experiments tend to show that the inclusions are the result of foreign bodies entering the cells from without. They must also be found in the nuclei of the leucocytes, if Aschoff's criticism is to hold. For the nucleus these authors assume that the birdseye inclusions are formed in various ways. They assume these bodies are formed within the nucleus and that the central body which is often acidophile is derived from the nucleolus of the cell, which is basophile, by some process which simply changes its staining affinity. The inclusions with acidophile central bodies are in appearance identical with the inclusions in the protoplasm. They suggested that in many cases extrusion of the nucleolus with transformation of its staining affinities might account for the formation of some of the inclusions in the protoplasm. The idea that the inclusions with acidophile central bodies might have penetrated into the nuclei from the protoplasm, in which case it is not necessary to assume a mysterious transformation of the staining affinities of the central body, does not of course occur to these authors, whose purpose is to show that the inclusions are derived from the constituents of the cells and have not entered from without.

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*Steinhaus. Virchow's Archiv. Bd. 126.

†Plimmer. The Practitioner. April, 1899.

Borrel, who appears for the present to lay less stress on the centrosome as the origin of the inclusions, believes on the other hand that in most cases they are metamorphosed leucocytes. That it is manifestly impossible to prove that an object in a hardened section is passing in either direction must be apparent. It would seem, however, that unless we assume a multiplicity of sources for these so characteristic inclusions we are not able to satisfy the many observers who have studied them from other than the parasitic standpoint. On the other hand, those who view them as parasites offer but one explanation, and are reinforced by the presence in other recognizedly infectious processes of the epithelium of inclusions likewise viewed as parasites, which they closely resemble.

In our original publication* we noted the presence of intranuclear inclusions but devoted our attention more definitely to the cytoplasmic forms. Since the publication of Councilman's article Calkins has demonstrated the frequent occurrence of typical intranuclear birdseye inclusions, thus confirming the observations of Steinhaus, Plimmer and Apolant and Embden. The work of Councilman, showing the presence of a complete cycle of an intranuclear organism in smallpox, must undoubtedly call attention to the importance and shed light on the probable significance of characteristic intranuclear inclusions in cancer. If the restrictions of Apolant and Embden are correct in the case of the intranuclear inclusions of cancer, they apply with equal force to the intranuclear inclusions of Councilman in smallpox, and Gorini in vaccine. The only essential difference in the two cases, as we have previously pointed out, is that vaccine and variola are accepted as certainly infectious and cancer is not.

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*Third Annual Report of this Laboratory for the year 1900.

The grounds on which most pathologists refuse to see in cancer an infectious process is that as yet all experiments calculated to show the infectious nature of cancer have as their basis the transplantability of the cancer cell. In the case of Borrel, however, the transplantation results appear to have brought conviction of the infective nature of the process. His belief that the inclusions both in cancer and smallpox are not parasites leads him to the hypothesis that the organism of cancer must be of ultra-microscopic dimensions.

For this reason it is well to consider what is the evidence of ultra-minute organisms for vaccine, variola and sheep-pox. The virus of sheep-pox has been shown by Borrel to pass through the Berkefeld and the coarser grades of the Chamberlain filter. Vaccine is supposed not to pass through any of the bacteria-proof filters. We are, however, informed by Dr. Georges Dryer that he has recently succeeded in passing vaccine through Berkefeld bougies which were proof against the bacillus of chicken cholera, recognizedly one of the more minute bacilli. This being the case, vaccine is placed on the same footing as the virus of sheep-pox. Mouth-and-claw disease, which is mentioned by Borrel as one of the filterable infective agents, has, however, nothing otherwise in common with vaccine and has been shown by Wasielewski never to produce inclusions or lesions in the cornea which can in any way be compared to vaccine and sheep-pox. *Should we conclude that in these diseases we are dealing with a micro parasite?*

Borrel in his publication brings light on this point. In his filtration experiments with sheep-pox he discovered that when he diluted the virus with tap water, after four days there developed in the filtered and otherwise sterile virus a small protozoon, to which he gave the name Micromonas Mesnili. The organism when in its largest form in the virus (it is of course impossible to affirm that the organism under other conditions does not possess a still larger phase), was three or four microns long and as many wide. That the organism in question had nothing to do with the virus was shown when distilled or sterilized water was used to dilute the virus. Borrel found that this organism followed the same law as the active principle of the virus, that is, it passed through the filters through which the virus passed and was held back by filters which were proof against the virus. That the organism passed through in some practically invisible spore form and then developed on the suitable medium of the virus was shown by its appearance in virus *only after four days* and the impossibility of detecting it in filtered water in which the larger forms did not develop. Borrel was forced to conclude that " Le passage à travers un filtre n'implique pas forcément l'idée d'un microbe invisible."* With these facts before him, however, Borrel pronounces against the inclusions as parasites and believes that the organism will prove to be a small if not an invisible organism.

It must be noted that Borrel's Micromonas shows as its largest form an organism considerably smaller than the larger inclusions of vaccine, variola and cancer. However, to assume that because the spore of an organism is sufficiently small to pass through a certain filter, its largest form would be within a certain limit of size, is not justified by biological knowledge. Calkins has described a protozoon, Lymphosporidium truttæ, the spores of which are one and one-half microns and divide into six sporozoites each less than one-half a micron in diameter. Borrel likewise points out that there is an essential difference between the smaller forms of motile, animate parasites and bacteria of relatively the same dimensions. The first are more plastic and accommodate themselves to the pores of the filter and pass through where bacteria are held back. In all probability the sporozoites of Lymphosporidium truttæ, less than one-half a micron in diameter, would pass through a bacteria-proof filter and yet the largest form of this organism is a multinuclear amœba twenty-five microns in diameter.

For this reason there is no ground for supposing that the filtration experiments are opposed to the protozoan theory of smallpox. What must we conclude then in the light of Councilman's and Calkin's observations? If these observations are correct we have an intranuclear and protoplasmic parasite of considerable dimensions, which, in one of its phases, passes through a Berkefeld bougie. The cytoplasmic and certain intranuclear forms described by Gorini have a recognized similarity of appearance to the cytoplasmic and intranuclear inclusions in cancer. The difficulty in carrying the analogy further is found in our inability thus far to separate from the epithelial cells in cancer an infective agent capable of producing cancer even in animals of the same species. All of the experiments in cancer have as their basis the epithelial cell, and it has thus far been impossible to apply with success filtration experiments similar to those of Borrel and others in smallpox. For this reason it is difficult to understand why Borrel, who believes in the infective nature of cancer, should seek its solution in an ultra-microscopic organism. It would appear that the closest analogy which we can draw between smallpox and cancer is the presence of the inclusions in the epithelial cells, and it would seem that filtration, even in the light of Borrel's experiments, in no way shakes the conclusions of Councilman and Calkins.

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* Without attempting to discuss all the filterable viruses it may be noted that the blood of yellow fever patients passes through the Berkefeld bougie but not the fine Chamberlain. Without regard to the work of the Marine Hospital Commission which has been so sharply criticised by Carrol, it must be noted that the relation of the mosquito to this disease strongly suggests a protozoon, perhaps an extremely small one.

We have maintained from the first that the solution of the vaccine-variola problem, with the establishment of the vaccine body as the vaccine organism, would bring, as a natural consequence, the establishment of the probable protozoan nature of the inclusions of cancer. The difficulty of the problem in cancer is unfortunately greater than in smallpox, owing to the limitation of experimental possibilities, but the advances which have been made in the study of the inclusions of the exanthemata have already thrown a suggestive light on the question of the inclusions in cancer. As the whole question stands, it must be conceded that the importance of questionable inclusions in processes with obscure etiology has greatly increased, and that the interpretation of the inclusions of cancer as parasites has gained rather than lost ground as the result of the researches of the last two years.

Report of the Biological-Chemical Department

By G. H. A. Clowes, Ph.D.

A brief summary of the work carried out in the biological-chemical department since the completion of the new laboratory was presented in the Fourth Annual Report. In the absence of sufficient reliable analytical data it was decided to postpone publication of results, especially those bearing upon the metabolism of patients suffering from cancer, until a sufficient amount of confirmatory evidence had been accumulated. The work of the chemical department, either in progress or contemplated, was considered under three main heads: (1) Studies in metabolism regarding the equilibrium of nitrogenous bodies, chlorides, etc., in the system, and including work on the stomach contents, blood and urine; (2) Micro-chemical investigations carried out with a view to obtaining evidence regarding the cause of cancer and the nature of the disturbances taking place in the metabolism of the individual cancer-cells; (3) Attempts to cure cases suffering from cancer by means of serum-therapeutic treatment or chemical agencies, the possible value of which had been indicated by investigations carried out under the two first heads. To these three main lines of work must be added a fourth, to which a considerable amount of attention has been paid in the course of the last two years; the examination of cancerous material and the serum of cancer cases for hæmolysins, precipitines, etc., applying the principles evolved in immunity studies carried out in other directions.

The work included under the heading of metabolism is practically completed and the results obtained are to be found in a series of papers published in this report dealing with the nitrogen and chlorine equilibrium established between the food and excreta of cancer cases, and the influence of varied proportions of salts in the diet upon the blood and urine. In this portion of the work special attention has been paid to the question of improving the nutrition of patients suffering from tumors which from their nature and location are capable of interfering with the proper assimilation of food.

A paper has also been included dealing with the secretions of the stomach in cancer as compared with normal and other pathological conditions and indicating to what extent chemical analysis of the contents of that organ can be utilized for diagnostic purposes, and also endeavoring to throw light on the nature of the disturbances in osmotic equilibrium which lead to an interference with the normal secretions.

In a paper dealing with the possibility of diagnosing cancer by considering the nature and proportion of the various urinary constituents it is pointed out that any indications obtained by this means regarding the location of a tumor are purely the result of secondary interferences with the metabolic equilibrium of the cells of the organs involved, and that no specific cancer reaction can be said to have been obtained by this means.

Abstracts of papers published in other journals dealing more particularly with the physico-chemical problems involved in the osmotic equilibrium of a variety of pathological cases have been included.

Throughout the work referred to above an effort has been made to present a thorough summary of the literature to date of publication, and to point out wherein the work carried out in this Laboratory is in agreement with or deviates from that of previous investigators.

Under the second head of micro-chemical research a paper dealing with the staining reaction of mast cells, etc., has already been published, and further work of this nature dealing more especially with the cancer-cells themselves is already in course of completion. Special effort is being devoted to the problem of obtaining an immunity against cancer, and horses are being employed for the preparation of sera. The results obtained in this direction are not, however, sufficiently positive to permit of any immediate expression of opinion regarding the ultimate probability of success. The possession of a series of cancer mice, kindly put at the disposal of this Laboratory by Professor Jensen, has made it possible to commence experiments on immunity on a much larger scale and with much greater likelihood of success than was possible when dealing with human cases exclusively.

In view of the interest attaching to the employment of X-rays in the treatment of cancer, a short note on the influence which they exert on the metabolism of normal animals has been incorporated in this report.

A series of analyses of mouse tumors taken at various stages of development is being carried out in this Laboratory at the present time. Such tumors, having an absolutely common source, afford a much more satisfactory basis of comparison than can be hoped for from a series of human tumors.

Finally, with a view to possible early diagnosis, tumors and the blood sera of cancer cases have been examined for hæmolysins, precipitines, etc. Whilst certain positive results have been obtained, it has not at present been possible to prove conclusively that the reactions in question were directly dependent upon the cancer, or the result of some secondary interference. With the cancer mice at our disposal it is hoped that we shall be able to obtain positive results bearing on the question of immunity and serum diagnosis, to which it is proposed to devote the special attention of this Laboratory during the forthcoming year.

Studies in Cancer Metabolism

By G. H. A. Clowes, Ph. D., W. S. Frisbie, Ph. B., and H. H. Glosser, M. D.

A review of the literature published in the course of the last fifty years on the equilibrium of nitrogenous bodies and salts in cases of impaired metabolism makes it apparent that the most divergent views are held on this subject by different investigators. Marked disturbances in the secretion of urea and chlorides in cachectic cancer cases were first observed by Vogel, Rommelaire, Jacoby and others, but these early investigators made very little attempt to carry out strict analyses on the food stuffs consumed in comparison with the waste products excreted. Müller and Klemperer (to whose publications a detailed reference will be made later) came to the conclusion that under the influence of toxic bodies produced from tumors a loss of nitrogen was suffered by the body, while Moraczewski in the majority of his cases finds a retention of nitrogen in the system, the amount contained in the food being in excess of that secreted in the urine and fæces. Similar differences of opinion are to be noted in the works of Müller, Laudenheimer, Schöpp, Bouveret, Böhne and Moraczewski on the retention or secretion of chlorides. A considerable increase in the proportion of sodium chloride in the blood of certain cancer cases has been observed by Moraczewski, and it has even been claimed that greatly increased quantities of chlorides are retained by certain organs of the body, especially in those cases in which an œdematous condition is to be observed. In many of the cases investigated disturbances in the equilibrium of salts were found to be associated with an impaired secreting function of the kidney, which would make a clear differentiation between cause and effect extremely difficult. Great advances have been made in physical and physiological chemistry since the publication of the work of these early investigators. The laws of osmosis governing the equilibrium between soluble salts, the body fluids and the cells render it extremely improbable that large quantities of sodium chloride, for example, could be retained in the system, as has been claimed by some writers, without the retention of a corresponding quantity of water necessary to maintain, at any rate to a certain extent, the osmotic equilibrium, which would cause an increase in body weight. The ability of certain electrolytes to aid in the removal of products of suboxidation from the system, has long been recognized and more recently the studies of Köppe, Hamburger, Gerber, etc., on the metabolism of blood cells have demonstrated the significant role played by chlorine ions in the removal of products of oxidation from the cell. It is perfectly conceivable that toxic bodies produced from a tumor might seriously interfere with normal osmosis; also that the abnormal products produced through the disintegration of cells and the influence of toxins might prevent to a certain extent the dissociation of salts, thus interfering with their normal function and at the same time reducing the osmotic tension which they exert and lead to their retention in larger quantities in the system, such a process being accumulative in its action. Loeb, Matthews, Calkins, etc., have shown how significant is the role played by electrolytes in the stimulation of individual cells, and the possible influence of disturbances in osmotic equilibrium of the cell leading to its proliferation can scarcely be ignored.

In this paper it is proposed, in the first place, to summarize the existing literature bearing on the problem of nitrogen and chlorine metabolism in cancer as compared with the normal, and subsequently to record some results having a bearing on this subject obtained in this Laboratory in the course of the last two years. Whilst our main object in carrying out these experiments has been to find some means of improving the nutrition of cases in which tumors have directly or indirectly interfered with the proper assimilation of food, and also to study the effects exerted by various salts and chemical bodies when taken in conjunction with the food or on direct injection, the exact analyses carried out from day to day on the diet, urine and fæces, and frequently on the blood, enables us to throw some light on the discrepancies observed in the literature and to arrive at definite conclusions which will be referred to at a later stage.

In reviewing the early literature one of the things that first impresses itself on one's mind is the absence of accurate data regarding the diet, the frequent disregard of the loss of nitrogen and chlorine in the fæces and the failure to record variations in the weight of patients. It should be possible to obtain a more or less accurate balance between the increase in weight of the tumor, the loss of body proteid, the formation of œdematous fluids and all such factors, when considered in conjunction, with the differences between intake and output of nitrogenous bodies and salts in a given period of time. In work of this nature the sources of experimental error, especially in the hospitals, are, as Müller points out, extremely numerous. Our own experience has taught us that unless the intelligent cooperation of a patient is obtained, or at least of all those immediately concerned with the charge of the case, it is perfectly useless to look for even moderately reliable results, however accurate the work in the laboratory may be. It is very probable that careless patients, especially those capable of moving freely about the wards, have deceived those who were interested in studying their metabolism, not only as regards their diet but also with reference to the twenty-four-hour secretion of urine, a fact which might well explain the contradictory results obtained by different authorities. One surprising source of error frequently met with in the literature is to be found in the change from a solid to a liquid diet. Milk without any addition of chlorides contains considerably less chlorine in proportion to the nitrogen than does the normal diet, consequently a diminished secretion of chlorides would be observed in the urine, and is not necessarily in any sense attributable to the influence of a tumor or other pathological cause.

Vogel, who was the first to investigate quantitatively the constitutents of the urine of a case of cancer of the liver, observed a daily secretion of urea under 8 grams and assumed that an actual retention of proteids took place in the blood in excess of those consumed in order to provide the materials required by the tumor cells in their development. Since, however, no records of the diet, of the nitrogen content of the stools or the body weight of the patient are recorded, this conclusion is scarcely justifiable. Rommelaire, in cases of cancer of the stomach, and Gregoire confirmed Vogel's observation of a greatly diminished secretion of urea, but these investigators seem also to have overlooked the probable diminution of proteids in the diet, and whilst reference is made to diarrhœa, no account seems to have been taken of the loss of nitrogen by that source. Robin expressed himself as opposed to the views held by the above-named writers, claiming that in well-nourished cancer cases the urea secretion was normal, and assumed that the diminution of nitrogen in the urea was simply to be attributed to a diminution of the quantity of proteid in the diet. Dujardin-Beaumetz supports Robin, finding in certain cancer cases high urea secretion, reaching 17 and 25 grams per diem, which he considers may be attributed to the influence of toxins secreted by the tumor, whilst certain nonmalignant tumors show results as low as 4 grams per diem.

The first work of this nature which can be said to have any real value was published by Jacoby in 1887. This author compared the daily nitrogen excretion of a normal individual with that of a case of carcinoma of the liver associated with jaundice, both cases receiving identically the same diet. He succeeded in demonstrating that whilst a normal individual could be made to gain weight and secrete less than 12 grams of nitrogen daily, the cancer case would lose weight and as much as 18 grams nitrogen would be eliminated in the urine.

The next paper on cancer metabolism possessed of any considerable value was published in 1889 by Friedrich Müller, who made an exhaustive study of the proteid equilibrium in a series of nine cancer cases, in some of which nutrition was mechanically interfered with by the tumor, and compared the results so obtained with experiments previously carried out by himself and other investigators (Senator, Monk and Zunz) on starving individuals. The conclusions arrived at by Müller are extremely interesting. He succeeded in demonstrating that in all his cases in spite of a rapid development of the tumor more or less loss of nitrogen was suffered by the body as a whole when the heavy loss of that substance in the fæces was taken into account. He also proved that this loss was more or less proportionate to the loss of body weight when due allowance was made for the formation of œdematous fluid. He further demonstrated that in those cases in which the nutrition of the patient was seriously disturbed by the developing tumor in such a manner that the loss of nitrogen by the fæces was practically equal to that contained in the food, the condition of starvation thus established was very comparable with that obtained in his experiments on starving normal individuals. In studying the influence of toxins produced by the tumor, Müller made one very valuable observation to the effect that whilst the average loss per kilo of body weight per diem was in the case of a series of starving healthy individuals only .103 grams nitrogen, that of four cachectic cancer cases amounted to .175, .225, .166 and .146 respectively. He also noted that even in one case in which the appetite of the individual under experiment was considerable, it was still found impossible actually to maintain the nitrogen equilibrium, although the amount of nitrogenous material assimilated was far in excess of that which would have been required by a normal individual of the same weight. He notes similar results in a case of typhoid during the early period of the disease and whilst the patient was suffering from toxic symptoms, the exactly reverse results being obtained during the period of convalescence. Müller concludes that in all cases of cancer the destruction of proteid suffered by the body owing to faulty nutrition and toxic effects is greater than the increase in proteid of the growing tissue of the tumor, and that consequently a loss of nitrogen is always suffered by the system. He attributes the coma of carcinoma to auto-intoxication through the products of metabolism which have not been removed owing to faulty functioning of kidneys affected by toxins. It is only to be regretted that this extremely accurate worker failed to take account of the chlorides present in the diet in order that they might be compared with those of the urine and fæces. In his analyses of urine the quantity of chloride was frequently extremely low, and he concluded without much ground that this signified the destruction of body proteid rather than circulating proteid. Sticker and Huebner observed a much higher secretion of sodium chloride in nonulcerating carcinoma than was the case in ulcerating carcinoma of the pylorus. G. Klemperer, who carried out fairly exact metabolism experiments on seven cancer cases, confirms the original observation of Jacoby, that when normal individuals and cancer cases are submitted to the same conditions of experiment, the former may gain whilst the latter lose in body proteid, a difference in nitrogen content of the food and excreta as high as 7.5 grams daily being observed. Huebner considers that the diminution in the alkalinity of the blood, and the fatty degeneration of organs, associated with increased tissue destruction, may be looked upon as evidence that carcinoma is an intoxication disease, and that the coma associated with the last stages may be attributed to the action of the poison derived from the tumor circulating in the blood and acting upon the central nervous system. Bouveret attempted to differentiate between diseases associated with hyper-secretion of hydrochloric acid in the stomach and cancer of the stomach by means of the secretions of chlorine in the urine, claiming an increased excretion associated with diminished secretion of hydrochloric in the stomach. This finding was not in agreement with that of Stroh, who observed a diminution in the chlorides secreted in both cases. Laudenheimer, experimenting on five cancer cases with reference to the chloride equilibrium, obtained in two cases a secretion of chlorides comparable with the consumption and in two other cases a marked diminution of the secretion of sodium chloride in comparison with the consumption. This author concludes that the disturbances in chloride equilibrium are the result of nephritic or circulatory retention of water and salts. Schöpp in a couple of papers claims that whilst the excretion both of chlorine and nitrogen frequently falls below the amount assimilated in cancer cases, the difference may generally be attributed to ulceration of the tumor, the secretion containing considerable quantities of sodium chloride. In a case of cancer of the stomach and one of breast carcinoma, equilibrium was maintained in the absence of ulceration.

From 1895 to 1897 a series of important papers were published by Moraczewski on the blood and urine in cancer, on metabolism in carcinoma and chlorisis, and subsequently on leucæmia and pseudo-leucæmia. In the first paper on the chlorine and phosphorus content of the blood and urine in cancer, after referring to the literature, the author estimated phosphorus, chlorine and nitrogen in the blood and urine of cases of carcinoma, anæmia and other pathological conditions. He found a reduction in the phosphorus content of the blood from the normal of .1 per cent to .07 and .04; chlorine, on the other hand, was high, amounting to as much as 4 per cent of the dried substance. He remarked further that as the chlorine in the blood increased the chlorine in the urine decreased in cases of carcinoma, but no particular reference was made to the condition of the kidneys. He considered that the nitrogen content was also increased in proportion corresponding with the increase of chlorine in cancer but not in anæmia. Moraczewski's work on cancer metabolism published in 1897, eight years later than that of Müller, gives results which are in no sense in accord with those obtained by the latter investigator. Whilst Müller observed a heavy loss of nitrogen in a long series of cases, Moraczewski found that large quantities both of nitrogen and chlorine were retained by the system, and at the best an approximate equilibrium was established. In none of his cases was a loss of nitrogen recorded over any extended period. The amount of nitrogen and sodium chloride retained in the system in a short space of time was frequently vastly in excess of the amount which would correspond with the changes in weight of the patient. In fact, in certain cases it is apparent that there must have been some source of experimental error, the quantities secreted being so far below those assimilated that either the patient must have gained ten or twenty kilo instead of, as was actually the case, undergoing very slight changes in weight, or chlorides must have been deposited in the tissues, which is practically impossible. Were it not for these discrepancies this work of Moraczewski's would be a most valuable contribution to the study of cancer metabolism. This author observed the proportions of nitrogen, chlorine, phosphorus and calcium in the twenty-four-hour urine whilst subjecting the patient to the influence of various salts, the diet being maintained on as uniform a basis as possible. He concluded that in cancer large doses of sodium chloride or calcium phosphate may be used to effect a saving of proteid whilst they stimulate the excretion of chlorides. He failed, however, to take account of the probable retention of waste nitrogen products in the œdematous fluids resulting from the presence of large quantities of these salts. He found that silver nitrate given in small doses increased the secretion of nitrogen and phosphorus and decreased that of chlorine and calcium, chlorides being retained as might be expected. Silver nitrate, however, produced diarrhœa and other acute symptoms in some of the cases to such an extent as to be discontinued. More especially was this effect to be noticed in anæmic cases. He concluded that the retention of chlorides is increased with the increase of anæmia, which is in accord with the supposition that such a retention of salts might merely represent the dilution of blood or body fluids which takes place under these conditions. He also found that phosphorus is retained in conjunction with chlorides in spite of the fact that phosphorus is present in the blood in proportions which are frequently the inverse of those of chlorine; also that the secretion of calcium is inversely proportional to that of phosphorus, and that a larger amount of calcium is retained in slightly anæmic conditions. In one case, for example, the addition of ten grams of sodium chloride daily to the food led, as would be expected, to an increase in the retention of chlorine and nitrogen, whilst the entire elimination of chlorides from the diet and the addition of ten grams of calcium phosphate led to a considerable chlorine loss. On the other hand, .1 gram of silver nitrate resulted in what was practically a balance of the proportions of nitrogen and chlorine, a much larger amount of chlorides being retained than during the treatment with calcium phosphate. Ten grams of sodium phosphate led to a retention of nitrogen and calcium, chlorine remaining about normal. Five grams of sodium chloride and 5 grams of potassium chloride led to a retention of nitrogen and chlorine and a proportionate loss of calcium and phosphorus. On comparing cancer cases with those of chlorosis he concluded that the latter are capable of taking much larger doses of potassium chloride than the former without noticeable toxic effect. Whilst an immense number of results were recorded in this paper, their failure to balance and a want of agreement in some cases detracts from their value.

Moraczewski also published a series of experiments on the chlorine, nitrogen, phosphorus and calcium equilibrium in a case of leucæmia and the data which he obtained extending over a period of six weeks, whilst the patient was subjected to a variety of different treatments, would indicate that a very considerable retention of nitrogen and chlorine in the proportions respectively of 40 and 30 per cent of the diet had taken place, a result which is most remarkable when it is borne in mind that in spite of the apparently rapid development of the leucæmic tumor no great gain in weight had been experienced by the patient.

Böhne found in a marked cachectic cancer case an average retention of 3 or 4 grams chloride daily for the space of four weeks, and claimed to have observed on post-mortem examination of the liver a sodium chloride content four times as great as that in the livers of three other patients. His observation has been supported by that of Achard and Loeper, who claim that the salt content of the muscle tissue of œdematous cases (non-cancerous) in which the chlorides are strongly retained, can be as high as 4.1 to 5.6 grams per 1000 in comparison with the normal, which is 1.6 to 2.8 grams per 1000; also that the brain substance, which normally contains 1.1 grams per 1000, may under conditions of abnormal retention give figures as high as 4.3 per 1000.

Cetti, in a publication concerned principally with the relative proportions of nitrogen constituents in the urine, found in two cases a secretion of nitrogen in excess of the consumption; in two other cases an ability to establish a fair equilibrium. He concluded that an increase in the proportion of extractive nitrogen is always associated with a decrease in the proportion of urea nitrogen as the disease progresses. He simply observed with reference to the chlorides that the total secretion was low, except in the case of one patient, who was receiving a full, normal mixed diet.

Koziczkowsky, in a valuable paper on the equilibrium of chlorides, refers to the frequently observed diminution in the excretion of chlorides in fevers (with the exception of malaria) and in carcinoma. The experiments recorded in this paper are directed principally to the solution of the problem as to whether chlorides, and to a certain extent other soluble salts, play a direct or indirect role in nephritis and œdema. He concludes that the retention or secretion of chlorides does not follow the same laws as those which govern the removal from the body of the products of metabolism, urea and other nitrogenous bodies, phosphates, sulphates, etc., but fails to bring very much evidence to bear on the question as to whether the retention of chlorides is due to their association in the system with katabolic products, or to disturbances in the osmotic equilibrium and mechanical forces of the body, and the ready diffusion through cell membranes, factors which might prevent the normal removal of salt. Engelman, in a communication on the osmotic pressure of body fluids, records results considerably above the normal in certain cachectic cases, but such results are generally attributable to heart and kidney insufficiency.

Braunstein, in a publication* dealing with the secretion of chlorides, phosphates, nitrogen and ammonia in carcinoma, after reviewing the literature, gives the results of a series of analyses carried out on the urine of 10 cancer cases, in five of which an exact record has been kept of the nitrogen and chlorine of the diet. In three of the five cases a loss of nitrogen was to be observed. In one case of carcinoma of the œsophagus the influence of the tumor on the destruction of proteid was very marked, the average daily loss for a period of four days being 10.6 grams nitrogen. In this case the chlorides were extremely low, both in the diet and in the excreta, no great difference being observed. Numerous experiments carried out on healthy individuals in a state of inanition show a loss of only three to five grams nitrogen daily, consequently any such loss as that recorded in the case referred to must be due to toxic action leading to an abnormal destruction of proteid. Braunstein failed to find any considerable differences between the salt content of the diet and the excreta, in certain cases the latter even exceeding the former. His experiments with diuretin led him to conclude that the sodium chloride secretion was directly proportional to the urine secretion, and that the accumulation of chlorides observed in certain cases was simply attributable to the failure of the kidneys to remove water, and with it the salts held in solution. He further states that in cancer an increase rather than a decrease of the secretion of chlorine in the urine may be looked for provided the kidney function is satisfactorily performed.

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*This publication was received in June, 1904, after the completion and shortly before the publication of this paper.

To summarize the literature on this subject, it may be said that widely differing results have been obtained by different authors, as regards the nitrogen and chlorine metabolic equilibrium of cancer cases. Whilst on the one hand it is claimed that nitrogen is retained in the system as a result of the tumor development and the demand created thereby for proteids, on the other hand it is shown that in spite of the tumor growth the nitrogen loss suffered by the system due to the destructive influence of toxins on the body proteids is very considerable except in those cases in which a marked œdema has developed, and in which the failure of the kidneys to function has led to an abnormal retention of waste nitrogen. Whilst numerous authors claim to have observed a diminution in the total amount of nitrogen and chlorine of the urine, especially in the last stages of cancer, few of the early writers regarded sufficiently diminutions in the proportion of chlorides in the diet, especially in those cases in which patients were no longer capable of assimilating solid food. Analyses of organ and body fluids showing an extraordinarily high content of chlorides, and records of the retention of enormous quantities of salt in the system far in excess of the amounts which would correspond with the observed variations of body weight and the laws of osmosis, lead us to suspect some source of experimental error, especially in view of the great difficulty in such work of properly controlling the individual submitted to experiment.

The possible importance of the chlorides in the establishment of metabolic equilibrium is more readily appreciated at the present day than was possible at the time at which most of the experiments referred to above were carried out. The intervention of modern physico-chemical theories of solution in physiological problems has demonstrated the important role played by individual ions and the dependence of any such influence upon the concentration and degree of dissociation of the compound from which they are derived. It has long been known that in fevers and other morbid conditions the equilibrium of the chlorides in the system is materially interfered with. This action may be due in part to mechanical causes brought about indirectly by the action of toxins on the cells of the heart, kidneys and other organs more especially concerned with the balancing of pressure, and consequently to a certain extent of diffusion and osmosis in the system. It may also be attributable to the action of toxins and of toxic products of faulty metabolism capable of clogging, so to speak, the normal functions of the salts in the system by preventing their proper dissociation into ions. The effect of toxins and foreign bodies upon the protoplasm of those cells of the stomach and kidneys, for example, which are capable of exerting a so-called vital secretory action on chlorides, etc. (not necessarily, so far as our present knowledge is concerned, in direct accord with the laws of osmosis), resulting in an interference with its normal function, its degree of viscosity and permeability, is a problem still open to investigation. These and many other possibilities must eventually be carefully considered, but bearing in mind the innumerable observations in cancer cases of interference with the secretions of the stomach, of increase in the chlorides and diminution in the alkalinity of the blood, of increase in the osmotic pressure of blood (Engelmann) and tissues (Hemmeter), of changes in proportion of salts in the tissues, of the production of œdematous fluids and of the diminution in the secretion of chlorides and variation from the normal rise and fall of chlorine secretion in the course of the day (Alb. Müller), it seems a matter of the first importance to throw as much light as possible upon the nature of the interference exerted in such cases, especially in view of the recent work on blood showing the role played by chlorine ions in the processes of oxidation and removal of waste products from the cells. The further possibility of variation in the proportion of potassium, sodium and calcium and other ions having a direct effect upon the proliferative tendencies of certain cells (referred to above) gives an added importance to the frequently ignored problem of salt equilibrium.

The main objects of our investigation have been as follows:

(1) To determine whether the change in weight of cancer patients was associated with a corresponding loss or gain of nitrogen by the system, and if so to what extent such results compared with those obtained from the study of normal individuals.

(2) To compare the chlorine of the food with that of the excreta with a view to discovering whether any absorption of chlorine by the body takes place, and if so to what extent.

(3) To determine whether the balance of chlorine retained in the system obtained by deducting the amount present in the excreta from that present in the diet possesses any direct relationship to the supposed increase in the chlorides of the blood and the formation of œdematous deposits; or whether the assumption of a diminished chloride dissociation can be made to account for the phenomena observed.

(4) To study the effect of adding or totally excluding chlorides from the diet as compared with the effect of such a treatment upon a normal individual.

The analytical methods employed were nitrogen by the Kjeldahl process, sodium chloride by the Salkowski or Moraczewski method, ammonia by the procedure of Schlösing, uric acid by the Hopkins method, phosphates by titrating with uranium nitrate solution and other constituents of the urine as described in the text.

METABOLISM EXPERIMENTS.

CASE I. NORMAL INDIVIDUAL.

The absence of accurate data in the literature regarding the influence of varying proportions of chlorides and other salts upon the metabolism of normal individuals rendered it advisable to carry out a series of experiments on one of ourselves which might afford a basis for comparison with some experiments made on individuals suffering from cancer. Dr. G.; physician; age 32; weight 66 kilo; health normal, received for two separate periods (one of 13 days, the other of 9 days) a diet in which the exact amounts of nitrogen and chlorine were carefully determined. In addition variations in body weight were recorded and the total volume, specific gravity, nitrogen, chlorine, phosphorus, uric acid and ammonia of the urine and the nitrogen and chlorine of the fæces were estimated. For the first five days a comparison of the nitrogen content of the food and excreta showed that a state of equilibrium might most readily be maintained on an average consumption of proteid containing from 13 to 14 grams nitrogen per diem. For the remainder of the first period and the second period considerable variations in nitrogen and chlorine content of food were accompanied by corresponding variations in the proportions of those substances in the excreta. The tendency to establish a state of osmotic equilibrium may most readily be recognized by drawing curves representing the variations in body weight, nitrogen and chlorine of the food and nitrogen, chlorine, uric acid and ammonia of the urine recorded in Table I. The weight of the body was found to be far less affected by the variations in nitrogen than by those in chlorides. Any large increase in the amount of proteid food consumed in excess of 14 grams nitrogen was apparently only partially removed by the urine, and whilst an increased amount was eliminated by means of the fæces, a considerable portion was apparently retained in the system. For the last two days of the first period a considerable reduction of the proteid of the diet (showing respectively 9.1 grams and 5.1 grams nitrogen in the food), led to interesting results. Whilst the reduction of the food from about 13½ grams to 9 grams nitrogen led to a fall of the total nitrogen of urine and fæces from about 13½ to 11.3, a reduction of the total nitrogen of the food to 5.1 in the last day was accompanied by a total nitrogen excretion of 9.3 grams. An examination of these figures shows that the reduction in the nitrogen of the food is accompanied by a proportionate loss in nitrogen on the part of

TABLE I.

First Period.

DATE.	Nitrogen in food.	Nitrogen in urine and fæces.	Sodium chloride in food.	Sodium chloride in urine and fæces.	Body weight in kilgms.	Uric acid.	Ammonia.
January.							
24–25	14.0	14.1	......	......	65.9	.58	......
25–26	15.3	15.0	......	......	65.1	......	......
27–28	12.4	13.5	7.9	8.1	65.4	.33	.87
28–29	15.5	13.7	8.1	7.9	66.1	.34	.80
29–30	13.9	15.9	27.6	20.0	66.4	.74	.63
30–31	13.9	14.2	23.0	23.6	66.5	.51	.81
31–1	17.6	14.6	12.1	17.6	66.1	.46	.76
1–2	13.0	13.1	2.0	9.5	65.1	.33	.78
2–3	9.1	11.3	1.3	3.8	64.3	.36	.60
3–4	5.1	9.2	9.3	5.4	64.7	.46	.56

Second Period.

DATE.	Nitrogen in food.	Nitrogen in urine and fæces.	Sodium chloride in food.	Sodium chloride in urine and fæces.	Body weight in kilgms.	Uric acid.	Ammonia.
March.							
30–31	12.2	10.7	......	......	66.7	.48	......
31–1	15.4	17.6	32.2	26.5	66.7	.67	.91
1–2	12.8	13.2	30.3	27.8	67.5	.52	.83
2–3	14.0	14.1	7.8	12.8	67.0	.43	.97
3–4	11.4	13.9	6.5	9.7	66.7	.46	.76
4–5	11.6	13.9	4.1	6.8	66.4	.47	.84
5–6	12.1	12.8	6.6	6.3	65.8	.38	.69
6–7	8.2	11.3	13.7	10.6	65.7	.43	.82
7–8	6.6	11.3	3.8	7.6	66.0	.35	.57

the body, but that the loss in question is not equal to the difference between the nitrogen of the food for the day in question and the normal, but about one-half of that quantity. During the greater portion of the second period the nitrogen of the food was maintained on a fairly low level. For the first four days an average consumption of about 13.6 grams nitrogen was accompanied by a corresponding loss of 13.8. The following three days on which the nitrogen of the food was still further diminished to an average of 11.7 showed an appreciable loss of body proteid, the average of the urine+fæces being 13.5. On the last two days an average of 7.4 nitrogen in the food was associated with an excretion of 11.3 grams nitrogen, or a difference of nearly 4 grams derived from body tissue. In this case, as in the first period, it will be observed that the loss of body proteid is not equal to the difference between the nitrogen of the food consumed in the period in question and the normal average amount for a corresponding period, but represents a certain proportion of that amount, in this case rather more than half.

Owing to the difficulty of carrying such experiments further it was not possible to test the effect of still further diminishing the proteids of the food or entirely removing them from the diet for the space of another day. The figures obtained by producing curves would indicate that the amount of nitrogen lost daily in a state of absolute starvation would be from 6 to 7 grams (or .1 gram per kilo) thus exceeding the figures 3 to 5 grams given by Klemperer and Blumenthal. They would on the other hand be lower than those obtained on Cetti by Senator, Zunz, etc., which are considered to have been abnormally high, owing to the toxic influence of the tuberculosis from which it was discovered that Cetti was suffering.

These normal experiments and a second series on a case of cardio-spasmus, which will be referred to later, justify the assumption that the daily loss of an individual weighing 66 kilos would be from 6 to 7 grams in a state of absolute starvation provided no toxic influences were concerned; consequently the loss of nitrogen per kilo of body weight in excess of .1 gram per diem may be attributed to the influence of toxic agencies, a point which will be referred to at a later stage in considering the metabolism of cachectic individuals.

Under normal conditions the sodium chloride of the food and of the urine lay apparently between 7.5 and 8 grams per diem. On raising the total sodium chloride of the diet in the course of one day from 8 grams to 27.6 only 19.3 was excreted from the kidneys which, with .7 in the fæces, gives a total of 20.0, thus showing a gain of 7.6 grams by the body. The following day the consumption of 22.99 grams sodium chloride was accompanied by a loss of 22.8 in the urine and .7 in the fæces, giving a total of 23.6 for the excreta. A practical balance was thus established on this day. On the following day, when 12 grams only were consumed, a total of 17.6 was eliminated, the body thus tending to recover its normal chlorine equilibrium, a result which was completely effected on the following day when, starving the patient of chlorides, only two grams being introduced into the diet, as much as 9.5 grams was still excreted. A still further reduction in the chlorides of the food to 1.3 on the following day was accompanied by a loss of 3.5 in the urine, or a total of 3.78 in urine and fæces, thus showing a still further loss on the part of the body of salt. The following day ended the first series of experiments with an increase in the consumption of salt to the normal figure, about 9.2 grams, and a loss of only 5.3, showing a tendency on the part of the system to retain chlorides in order to replace those which had been secreted during the previous period of chlorine starvation. Very similar results are to be observed in the second period, 32.2 and 30.3 grams in the diet the first two days being associated with a loss of 26.5 and 27.8, showing a retention of 5.7 and 2.5 grams, or a total of 8.2. On the two following days a reduction of the chlorides of the diet to quantities slightly below the normal was accompanied by a loss of 5 grams and 3.2 grams respectively, or a total of 8.2 grams, thus showing an exact balance of chlorides for the first four days. On the fifth day a reduction of the sodium chloride of the diet to 4.1 grams was associated with a loss of 6.8 grams, thus showing a loss of salts on the part of the body. The same interesting tendency to maintain a balance is to be noted to the extreme end of the series, the sum totals of intake and output of chlorides being for the entire period almost identical. The chlorides retained in the fæces normally amounted to .2 grams daily, but on those days on which large quantities were consumed an increase to .71 and .77 respectively was noted. In view of a recent publication to the effect that the chlorides only pass by way of the fæces after 24 hours, it is interesting to note that the almost full effect of the large doses of chlorides were observed in the space of the first 24 hours after their administration, and that without any accompaniment of diarrhœa. The effect of large consumption of NaCl on the nitrogen excretion is marked, the maximum loss of nitrogen in each period being associated with the maximum consumption and excretion of chlorides.

The body weight was found to vary directly with the amount of chlorides consumed, or more strictly, those retained in the system. In the first period the maximum of weight, 66.4 to 66.5 kilos, was observed in the course of the two days on which the largest amounts of sodium chloride were consumed and 7½ grams retained in the body. The gradual diminution of the amount of chlorides in the diet, with a gradual increase of the proportion of chlorides excreted until the latter were considerably in excess of the former, led to an exactly corresponding decrease in the weight of the individual. The minimum weight observed in the series of experiments, 64.3 kilos, was reached on the day of maximum chloride starvation, the day on which 1.3 grams only of sodium chloride was consumed in the food and 3.8 excreted, following the day on which 2 grams in the food had been accompanied by a loss of 9.5 grams. The total loss of weight between the maximum and minimum points, slightly in excess of 2 kilos, was accompanied by a loss of chlorides amounting to more than 15 grams, which would fully account for that difference in weight, assuming that a .75 to .8 per cent sodium chloride solution were isotonic with the serum. The following day a considerable increase in the salt of the diet was accompanied, as would be expected, by a retention of that substance in the system previously impoverished and consequently an increase in weight of the body was observed, although at the moment a considerable diminution in proteid in the diet accompanied by a loss of nitrogen would normally have led to a loss of weight.

In the second period the balance is even more exact. At first the retention of 5 or 6 grams sodium chloride is accompanied by an increase in weight of .8 of a kilo to a maximum of 67.5. Subsequently a fall in weight to 65.8 was accompanied by a loss of sodium chloride of nearly 11 grams. In this period also the actual loss of nitrogen on the part of the body produced an insignificant effect upon the body weight as compared with the variations in chlorides. A comparison of the volumes of water ingested and excreted shows on the average a preponderance of the former over the latter by 500 or 600 c.c. On those days on which large quantities of salt were consumed the volume of fluid ingested was about two liters and that excreted about 1300 c.c., the big secretion of sodium chloride being accompanied by a corresponding increase in total volume of urine, the specific gravity never rising above 1.023 to 1.022. On only one day in the series was the total volume of the urine in excess of the volume of water ingested, the day on which chlorides being reduced to a minimum in the diet, a large excess of salt in the system was removed in the urine.

It will thus be seen that the data bearing on body weight and intake and output of water correspond exactly with the variations in the proportions of chlorides of the diet and excreta. An investigation of the chloride figures makes it appear probable that a period of 48 hours frequently elapses before chloride equilibrium is completely established in the system, but such an equilibrium is effected very readily in contrast to the pathological cases referred to subsequently.

Effect of variations in the proportion of chlorides upon other constituents of the urine.—On those days on which the normal amount, about 8 grams of sodium chloride, was consumed in the food and excreted in the urine, the nitrogen of the urine was about 12.5, the phosphates, estimated as P_2O_5 about 2.5, and the uric acid .33 to .34 grams, the ammonia about .6 grams. A great increase in the amount of salt in the diet led to a great increase in the total volume of the urine, a slight increase in the total nitrogen excreted, an increase in the phosphates and a very large increase in the amount of uric acid, with a slight decrease in the ammonia. The uric acid results are most instructive. Two days of a normal salt diet with a uric acid secretion of .32 and .34 grams were followed by three days on which an abnormal amount of salt was consumed and gradually excreted by the kidneys, on which days respectively .74, .51 and .46 grams of uric acid, giving an average of .57 grams per diem, were removed. It will thus be seen that during the period of large salt consumption and increased excretion of water and chlorides either an increased destruction of the nucleus of cells was brought about, leading to an increase in the excretion of uric acid, or a more complete removal of the latter substance from the circulation was effected, owing to a great increase in the amount of water and salts. This latter theory is in accord with the results published by one of us on the freezing point of the urine, which indicate a probable relationship between the excretion of small ions and of large complexes such as uric acid. Following the uric acid table further, it is interesting to note that in the next two days of chlorine starvation the quantity of sodium chloride excreted adjusts itself to the normal and is accompanied by normal amounts of uric acid .33 and .36 respectively. On the last day where the factor of starvation has to be considered an increase in the amount of chlorides and partial starvation led to an increase in the amount of uric acid, .46 grams being removed. Similar results were recorded in the second period.

The excretion of ammonia appears to be much less affected than is that of uric acid by the variations in proportions of sodium chloride, but the first day on which large quantities of salt were excreted shows a diminution in the amount of ammonia, and it may be said that, generally speaking, a slight fall in the ammonia in proportion to the total nitrogen appeared to take place when large doses of salt were employed.

Throughout these series of experiments and in spite of large variations of chlorides the relationship of the freezing point to the specific gravity was found to be far more constant than would be anticipated.*

Analyses of the nitrogen and sodium chloride content of the blood were made on April 1st at the point of maximum salt assimilation and on April 5th at a stage of salt starvation:

	Nitrogen.	Sodium Chloride
April 1st	3.01	.402
April 5th	3.43	.427

From which it will be seen that whilst the nitrogen is greater on April 5th, the proportion of sodium chloride to nitrogen is higher on April 1st.

The effect of chlorides tending to produce œdema when administered in large doses.—The increase in body weight to a maximum under the influence of large quantities of sodium chloride and its fall below the normal on reducing the salt in the diet to a minimum whilst the proteid consumption was maintained at a fairly constant level and the nitrogen equilibrium of the system underwent practically no change, has been referred to in the discussion of the body weight and chloride balance. It was further shown that the loss of chlorides suffered by the body between the maximum and minimum weights corresponded fairly well with the difference in weight, on the assumption that a salt solution almost isotonic with the blood serum was being removed from the body. It was also noted that the variations produced by changes in the chlorides were so much more marked than those brought about by reduction or increase of the nitrogen as to entirely mask the effects of the latter on the body weight.

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*See "The relationship between the freezing point depression and specific gravity of urine, under varying conditions of metabolism, and its clinical value in the estimation of sugar and albumin," by G. H. A. Clowes, American Journal of Physiology, Vol. IX, July 1, 1903.

It is interesting to note the space of time required by the body of a healthy individual to bring about a chloride equilibrium, the figures recorded showing that this may be accomplished in from 24 to 48 hours, a point which will be referred to subsequently in carrying out some experiments on œdematous pathological cases.

*CASE II. CARCINOMA OF THE PYLORUS.

J. W.; age 75; weight 51 kilo.; widower.—Gives no definite history of duration of disease. Has for months past experienced considerable difficulty in taking food. Is very much emaciated and very cachectic and is not sufficiently intelligent to give a reliable account of himself. Examination shows prominent tumor on inspection in the epigastrium, which on palpation is hard, immovable and seems to involve not only the pylorus but the tissues about it. Patient is very feeble.

Death occurred on April 2, 1903, and the autopsy revealed the following conditions: On opening the abdomen about 300c.c. of turbid fluid was found in the region of the stomach and spleen. No general peritonitis was observed. A large tumor mass, irregular in shape, involving most of the pancreas, the entire pyloric end of the stomach and one-third of its greater curvature, was found. The size of the mass was about that of two fists. Neither duodenum, liver nor any other abdominal organ was involved. On section the pylorus showed a very small opening into the duodenum and a surface as large as a man's hand of tumor tissue ulcerating and necrotic. Pathological examination confirms diagnosis of carcinoma of pylorus with metastases involving the pancreas.

For a period of twelve weeks analyses were carried out on the complete 24-hour specimens of urine and fæces. For the eight weeks immediately preceding death the total nitrogen and chlorine in the food were estimated from day to day. During this latter period the patient was for the most part on a liquid diet, which considerably facilitated compilation of data. The principal objects to be gained by this series of experiments were (1) a comparison of the nitrogen and chlorine of the food and excreta over an extensive period immediately previous to the decease of the patient; (2) the influence of varying proportions of sodium chloride in the diet; (3) a comparison of the relative

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*We are indebted to Dr. Matzinger of the Laboratory staff for the histories and autopsies on this and subsequent cases, III, IV, V and VI.

proportions of various nitrogenous constituents, phosporus, chlorine, etc., in the urine, under the varying conditions that obtain at various stages in the development of the disease.

I. *Nitrogen and Chlorine Equilibrium.*

The results obtained have been tabulated in weekly periods showing the intake and output of nitrogen and chlorides as Na Cl and the gain or loss of these substances experienced by the body for each period (see Table II). An examination of the table shows that for the first two weeks the body was practically in a state of nitrogen and chlorine equilibrium, a total of 91.4 grams of nitrogen being assimilated and the same amount excreted, whilst 26.0 grams of chloride in the food corresponded fairly well with 25.0 in the urine and fæces without any appreciable loss being experienced in body weight. During the succeeding week, from the 18th to the 26th, 14 grams of nitrogen were lost and 2.8 grams of chlorine retained by the body, the condition of the patient showing a marked falling off. In the three succeeding weeks the body suffered a steady loss of nitrogen and exhibited an ever-increasing tendency to retain chlorine, till finally, in the 14-day period immediately preceding death, whilst the nitrogen loss was 33.7 grams, the retention of sodium chloride amounted to as large a quantity as 22.8 grams, only 3.5 grams being eliminated in the urine out of a total of 26.3 contained in the food. That is to say, over 80 per cent of the chlorine assimilated with the food remained in the

TABLE II.

	Nitrogen in food.	Nitrogen in urine and fæces.	Loss or gain, nitrogen.	Chlorine in food.	Chlorine in urine and fæces.	Loss or gain, chlorine.
Feb. 4–11........	45.0	49.0	− 4.0	11.8	11.7	+ .1
11–18........	46.4	42.4	+ 4.0	14.2	13.3	+ .9
18–26........	36.5	50.6	−14.1	13.0	10.2	+ 2.8
26–Mar. 5....	32.9	40.2	− 7.3	8.8	4.7	+ 4.1
Mar. 5–12........	45.9	50.4	− 4.5	12.2	4.0	+ 8.2
12–19........	38.1	56.0	−17.9	13.2	6.0	+ 7.2
19–26........	30.0	40.9	−10.9	17.8	2.0	+15.8
26–Ap. 2.....	21.6	44.4	−22.8	8.5	1.5	+ 7.0

system. In the course of the week period, from March 19th to 26th, for the space of 48 hours the amount of sodium chloride in the food was considerably increased in hopes of producing an increased elimination of chlorine, and with it the products of metabolism and suboxidation to which toxic effects at that time observed in the patient might be attributed, but the only result obtained by this treatment at so late a stage was an increase in the œdema of the patient. The total of the eight weeks shows a net loss of 77.5 grams of nitrogen and a gain of 46.1 grams of sodium chloride. There are, of course, in such work innumerable sources of experimental error due principally to negligence on the part of those whose duty it is to keep an exact record of the amount actually consumed by the patient in the course of 24 hours, but having due regard for the influence exerted by all such possible causes of error there can be no doubt that whilst a heavy loss of nitrogen was suffered by the system during the last six weeks, a correspondingly large retention of chlorine must have taken place. The loss of 77.5 grams nitrogen would correspond with a loss in weight of 2¼ kilo on the part of the patient whilst the retention of 46.1 grams of sodium chloride, if present in the form of œdematous fluid throughout the body, should involve a retention of a very large amount of water, at least four to six liters, and to about 40 grams of nitrogen which would otherwise have been eliminated. A certain proportion of the chlorides in question undoubtedly were present in such fluids, for especially during the last 25 days a very marked œdema of the extremities was to be observed, and at the autopsy large quantities of fluid were found in the peritoneal and pleural cavities as well as a very considerably enlarged liver and spleen, but it is scarcely possible that the retention of such a large amount of chlorine salts can be explained on the above basis, and it is highly probable that the presence of suboxidation nitrogenous products capable of forming double compounds with sodium chloride and thereby materially interfering with its dissociation in solution may account for a considerable portion of the discrepancy. It is also probable from analyses made on the tumor and other tissues that an increase of chlorides had taken place not only in the blood and body fluids but also in the tissue cells, more especially those involved in the tumor. Analyses of blood serum taken from the heart within six hours of the death of the patient and of fluids of the brain, the pleural and peritoneal cavities showed on analyses a chlorine content varying from .38 per cent to .4 per cent; the freezing points from .61 to .64° C., both of which quantities are considerably in excess of the normal.

2. *The Influence of Variations in the Quantities of Chlorides in the Diet.*

An inspection of the figures Table II will show that the patient was practically in a state of chlorine starvation, the daily average amount being little in excess of a gram of chlorine, or 1⅔ grams sodium chloride. The experiment in the course of the week, March 19-26, during which the amount of chlorides in the diet was increased to the extent of several grams, has already been referred to. During this period the chlorides to the extent of 15.8 grams were retained in the system, and in spite of a loss of nitrogen an increase in body weight of a kilo and a quarter, accompanied by a great increase in œdema, was to be observed. It is interesting to note that during this period the nitrogen loss was less than in either the preceding or following weeks, a fact which may presumably be attributed to the retention of nitrogenous waste products in the œdematous fluids. On once more reducing the chlorides to a figure lower than in any previous week the increase in œdema was no longer as marked, but the death of the patient at the end of the week in question brought the series of experiments to a close.

3. *The Relative Proportions of Nitrogenous Constituents, etc., in the Urine.*

Since this question will be dealt with in detail in a subsequent portion of the report dealing with the diagnosis of cancer by means of the urinalyses it will not be necessary to give any

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[NOTE.—The secretion of the skin should not be entirely neglected, as the proportion of chlorides eliminated in that manner is much larger than is that of other constituents in comparison with the urine.

figures at this stage. A table has been prepared showing the relationship of uric acid, ammonia, chlorine and phosphorus to the total nitrogen in weekly periods. A steady gradual rise in the proportion of uric acid nitrogen to total nitrogen, a considerable fall in proportion of chlorine to nitrogen with a fairly steady ammonia and phosphorus proportion is to be noted.

CASE III.

Mr. U.; age 60; weight 75 kilo.; German; married; occupation brewer.—No family history of cancer. Personal history good. Consumed much beer but was not intemperate. About one year ago patient began to complain of vague pain, high up in the epigastric region, which continued with some remissions and became more and more troublesome. Very soon distinct symptoms of stenosis of the œsophagus developed, such as pain in the chest on swallowing, increasing difficulty in getting solid food through and later regurgitation of food immediately after swallowing. The pain also increased and became more continuous, and six months later definite diagnosis of carcinomatous stenosis of the œsophagus a few inches above the stomach was made by his physician. Difficulty in swallowing even soft foods became more marked until finally only liquids could be passed through with difficulty. Frequent attempts at dilatation of the stricture were unsuccessful. Location of the cancerous involvement was made out definitely by œsophageal sounds. August, 1903, the occlusion was complete, so that not even liquid foods passed into the stomach and starvation was imminent. Patient suffered more from the extreme thirst than from hunger, and insisted on an operation which would give him at least relief from these symptoms. A gastrostomy was then performed and the operator was unable to discover any disease of the stomach. At the time of this examination patient has for over two months been fed through the fistulous opening. On inspection he shows no emaciation or marked cachexia. He has great difficulty in breathing and coughs violently at every attempt at speaking. This feature of his illness he complains of most. He is quite helpless and feeble, complains of headache and confusion due in part to constipation and in part to the regular use of morphia which is prescribed for the relief of pain. Physical examination shows a fairly well nourished body. Ascultation of the chest reveals no great abnormalities of the heart, but it is somewhat weak and rapid and irregular beat. In the lungs the larger bronchi are full of secretions on both sides. Rales, wheezing and shallow breathing in both; signs of pleurisy, or solidification of lung substance. Palpation of the abdomen reveals an enlarged liver pushing far over the stomach with no distinguishable signs of tumor but giving much pain on pressure, especially in the epigastric region. There is a considerable cushion of abdominal fat which makes accurate diagnosis difficult.

Course of the disease.—Patient was under observation five weeks. As stated above, he was, when first seen, dull, emotional and markedly toxic due at least in part to overfeeding of eggs and meat and a constipated condition with much flatus favored by the regular use of morphia to produce sleep and to relieve obstinate cough. A brisk cathartic had been given by his physician, and at our suggestion the amount of meat and number of eggs fed during the twenty-four hours was reduced, while more vegetable food was added so that the total nitrogen content of the meals averaged 9.5. A small dose of Carlsbad salt was prescribed to be taken every morning for a week, and his stomach was washed out four hours after each meal. When test meals were given the stomach was again washed out immediately before feeding and the food allowed to remain an hour and a half to two hours. This change was followed by marked improvement so that less sedative was required; sleep became more normal and the bowels more regular; there was less flatus and less cough. A marked improvement was also noticeable in the general appearance and conduct of the patient. He increased in weight, his color was better, he was clearer in his head, was less emotional and irritable and much stronger. At the end of two weeks he sat up most of the day, was bright and active mentally, read part of the time and was able to walk about and go out of doors on good days. This condition continued until the last week of patient's life, when increasing difficulty in breathing again became prominent, with much cough and need for sedatives and expectorants. The bowels became troublesome, toxic symptoms supervened, the heart became weaker and pulse more rapid. At the same time cachexia became marked with rapid emaciation and increasing weakness. He soon fell into a semicomatose condition and died on November 17, 1903.

Death occurred November 17, 1903.—Autopsy the following morning revealed the following conditions: The skin about the fistula was puffy and full of granulations, but with no appearance of cancerous involvement. On opening the chest the lung tissue was found normal, but there were slight pleuritic adhesions at the base of both lungs. Nothing unusual about the heart. Bronchial glands slightly enlarged and pulpy. Three inches of the œsophagus, immediately above the diaphragm, consisted of a large tumor mass completely occluding the lumen of the tube. The mass was about an inch and three-quarters in thickness and when opened was full of necrotic tissue. The cardiac end of the stomach was normal. The pylorus and the entire upper portion of the stomach showed nodules of various sizes beneath the mucosa, but no ulceration. The pancreas was normal. A few of the mesenteric glands were slightly enlarged. The liver was large, extending below the ribs and a considerable distance over the pyloric end of the stomach and contained numerous large foci of cancer varying from the size of a pigeon's egg to that of a pea. Other abdominal organs were normal.

For a period of six days exact analyses were carried out on the food and excreta with a view to determining the point of nitrogen and chlorine equilibrium, also the influence of an excess of chlorides administered in conjunction with the diet. The patient received three meals a day in the form of a semiliquid vegetable soup to which a small proportion of meat had been added. The principal object of this series of experiments was to observe the effect produced upon the general condition of the patient, the excretion of urine, more especially of nitrogen, ammonia, uric acid and phosphates, employing the diet referred to above as being most favorable, but for one period reducing the consumption of salt (NaCl) to a minimum, and in a second period increasing the amount of salt taken with the food to a quantity far in excess of the normal.

The accompanying Table III gives a comparison of the nitrogen and chlorine of the diet with the nitrogen, chlorine and uric acid of the secretions.

TABLE III.

DATE.	Nitrogen of food.	Nitrogen of urine and fæces.	Chlorine of food as *NaCl*.	Chlorine of urine and fæces as *NaCl*.	Uric acid.
Oct. 20–21	9.58	8.11	.98	3.88	.46
21–22	9.02	9.20	1.73	3.25	.45
22–23	9.04	7.63	1.88	1.49	.35
24–25	9.74	9.28	8.20	3.43	.38
25–26	9.73	8.50	9.89	7.96	.70
26–27	9.43	8.10	9.95	6.70	.52

The total volume of urine excreted in the first three-day period of small chlorine consumption was found to be extremely large, being about six liters. In the second period, when large quantities of salt were present in the diet, the total volume of urine was less than four liters, pointing towards a probable retention of fluid in the tissue, which was indicated to a certain extent by a slight increase in the œdematous condition of the patient.

The total nitrogen secreted in the urine showed practically no difference for the two periods. In the first 22.8 grams were eliminated and in the second 22.75; thus showing that the reduced volume of urine had not materially affected the removal of nitrogenous products. To the nitrogen secreted with the urine must be added that which was found in the fæces, amounting in the first period to 2.1 and in the second to 3.1 grams, giving totals of 24.85 and 25.9 respectively, which, when deducted from the nitrogen of the diet, 27.75 and 28.9 respectively, give differences of 2.9 and 3 grams, or an average retention by the system of one gram of nitrogen per day, which must be attributed to the improved state of the patient and possibly to a certain extent to the increase in œdema; but it is interesting to note that the amounts retained are exactly the same for the two periods in spite of the much larger retention of water and salt in the latter period.

Whilst in the first three-day period the total sodium chloride consumed with the food was only 4.6 grams, the sodium chloride secreted in the urine was equal to 8.24 grams and that of the fæces to .4 grams; in the succeeding three-day period, when the chlorine of the food equaled 28 grams, the amount secreted in the urine was only 17.64 grams and that in the fæces .45 grams, showing a marked tendency on the part of the system to maintain a chlorine equilibrium more or less following the laws of osmosis between the chlorides of the system dissolved in the blood, tissues, etc., and those of the kidney secretions. An examination of the amounts lost from day to day emphasizes this point, a fall to a minimum being observed at the end of the starvation period and a rise to a maximum in the course of the following three days of chlorine excess. But it should be observed that the total amount eliminated from the system in this period of time was only 26.7 grams, whilst 32.6 were introduced with the food. This tendency to retain a portion of the chlorine, taken in conjunction with the less marked retention of nitrogen referred to in the last section, may possibly be attributed partially to the increase in cancer tissue and to œdema, but also probably to a considerable extent to its association with products of suboxidation retained in the system.

The ammonia secretion in the first period was very large, reaching a total of 4.1 grams as against 1.75 in the second period, showing a marked improvement in the presence of large quantities of chloride.

The removal of uric acid and other bodies capable of reducing permanganate was, on the other hand, found to be larger in the second period than during the first. Whilst in the first period, with a limited chlorine diet and in spite of the large volume of the urine, only 1.26 grams of uric acid were removed, in the second period 1.6 grams were excreted with the urine.

Phosphates, which were absolutely constant in the diet, were also found to be practically constant in the urine and fæces, showing an average from 2 to 2.2 grams H_3PO_4 per diem.

An analysis of the blood showed a freezing point .57° and sodium chloride content .47 per cent, both of which are practically normal.

To summarize the results in this case it may be said that in the absence of toxic symptoms a practical equilibrium of nitrogen is established and a small tendency to retain chlorides exhibited.

CASE IV.

Mr. T.; age 66; Scotch; married.—Patient gives no family history of cancer or of tuberculosis. He has not had specific disease but has been intemperate. He gives an indefinite history of ten years' illness, referred particularly to the abdomen and kidneys. For the last few months he has had frequent urination, and the specimen contained varying quantities of blood. In the past year he has lost weight progressively and for the past five months has been confined to bed.

Patient died January 17, 1903, at the Buffalo General Hospital, and autopsy revealed the following conditions: Very marked emaciation. On opening the chest the right pleural cavity showed several large tumors the size of a plum, with cancerous disease of several ribs on the same side. The lung tissue was quite normal, and the bronchial glands were not diseased. In the abdominal cavity the lymph glands beneath the peritoneum were enlarged and hard. The stomach was free from cancerous change. The liver showed in the upper portion of the right lobe a slight metastatic carcinomatous growth. The mesenteric glands were not noticeably changed. The left kidney was large and soft while the right kidney was the seat of a large primary, carcinomatous tumor.

In this case a balance of the nitrogen and chlorine of the food and excreta was carried out for the nine days immediately preceding the death of the patient (see Table IV). The diet consisted exclusively of one or two eggnogs daily, the exact nitrogen and chlorine content of which was known. For two days a slight increase in the salt of the food was not associated with any considerable increase in that of the urine, but patient showed more marked œdema and became extremely cachectic. An examination of the table will show that whilst a steady loss of nitrogen was exhibited for the entire period, there was a strong tendency to retain chlorides in the system, and, as stated above, a slight increase in the chlorides of the food did not lead to greatly increased excretions and simply tended to accentuate the œdema of the patient. The uric acid nitrogen in comparison with the total nitrogen of the urine was high, varying from 1.7 to 2 per cent. The ammonia was above the normal from 5 to 8 per cent. In this case, in which the functions of the kidneys were materially interfered with, we have a marked illustration of the toxic symptoms associated with a considerable loss of nitrogen and a tendency to retain chlorides.

TABLE IV.

	Nitrogen of food.	Nitrogen of excreta.	Chlorine of food as *NaCl*.	Chlorine of excreta as *NaCl*.
8–9	5.1	8.3	2.0	.32
9–10	5.1	8.6	2.0	.32
10–11	5.1	10.5	2.0	.62
11–12	2.6	3.9	1.0	.08
12–13	5.1	5.4	2.0	.33
13–14	5.1	6.3	3.6	.55
14–15	5.1	6.8	3.6	.82
15–16	5.1	7.1	2.0	.45
16–17	2.6	4.5	1.0	.10
Total	40.9	61.4	19.2	3.59

CASE V.

Mr. C.; age 75; weight 65 kilo.—Sarcoma of skin and connective tissue. Patient presents a nodular discolored area in right epigastric region having a maximum diameter of six inches. Numerous tumor nodules, some of them as large as a walnut, apparently seated in the skin and the subcutaneous tissue, in the discolored area. Patient refused to submit to operation and left the hospital at the completion of the series of experiments. Whilst exhibiting toxic symptoms, his appetite was normal and nutrition apparently unaffected. For the twelve days that he remained in the hospital he received a diet containing approximately 11½ grams nitrogen and 8 grams sodium chloride per diem.

The analyses of urine and fæces were conducted with as great accuracy as those previously referred to, but in the diet a possible source of error is introduced, since analyses were only carried out on two days in the course of the experiment, giving 11.3 and 11.6 grams nitrogen and 8 and 8.1 grams sodium chloride respectively; on the remaining days the food being weighed to correspond as nearly as possible to the same amount. Our principal reason for including this case is the evidence which it affords of both a nitrogen and chlorine balance, even in the presence of a tumor which has reached considerable dimensions and in spite of marked toxic symptoms, provided the digestive organs are unaffected. A slight gain of nitrogen was apparently effected during each period, and the chlorides determined for the second six days showed a similar close relationship (see Table V); all of which corresponds with the body weight of the patient, which remained constant throughout the experiments. It is also interesting to note that in this case the uric acid nitrogen was averaging 1.4 per cent of the total nitrogen.

TABLE V.

Day.	Total nitrogen of food.	NITROGEN OF		Sodium chloride in food.	SODIUM CHLORIDE IN	
		Urine.	Fæces.		Urine.	Fæces.
1..	Approximately	9.4	for six days.	....	....	....
2..		7.3		....	....	....
3..		9.4		....	....	....
4..		10.7		....	....	....
5..		8.1		....	....	....
6..		10.1		....	....	....
	69.0 to 71.0	55.0	10.50			
		65.5				
7..	Approximately	10.1	for six days.	Approximately.	8.2	Only traces; disregarded.
8..		9.0			6.7	
9..		9.3			8.1	
10..		9.1			8.2	
11..		9.8			8.2	
12..		10.5			9.5	
	69.0 to 71.0	57.8	9.7	46.0 to 48.0	48.9	
		67.5				

The analysis of the blood showed 2.5 per cent nitrogen and .48 per cent NaCl.

To summarize results in this case it may be said that, in spite of the age of the patient and the development of the tumor, practically no effect has been exerted on his nutrition, which is fully up to the normal standard of a healthy individual of his age.

CASE VI.

Mrs. N.; age 58; married; weight 44 kilo.—No family history of cancer or tuberculosis. The patient can give no definite account of the duration of the disease except that it existed about a year, and that after it was first noticed in the vulva it was of considerable size and progressed very rapidly, particularly so in the past three months. On examination there is found extensive tumefaction of the right labium, nodular, hard and ulcerating on inner surface. There are also some nodules on the left side but not large. The entire vagina and cervix are involved in the tumor mass. There is much necrotic tissue and a dark, very offensive discharge. The growth on the right side is about the size of a man's fist. There are metastases in the immediate neighborhood of the right groin and perineum, also quite a large nodule in the right buttock. Patient is very much emaciated, feeble, cachectic and much of the time unable to take sufficient food, this last condition being aggravated by her mental state of depression. She has much pain, so much so that anodynes are required to give her rest and sleep.

In this case analyses were made on the 24-hour specimens of the urine for 45 days. For 24 days estimations of nitrogen and chlorine in the food, in the urine and the fæces were also carried out, but owing to the difficulty of properly controlling the patient only one period of six days can be looked upon as reliable.

1. *Nitrogen and chlorine equilibrium.*—For the first twelve days complete failure to effect an approximate balance of the nitrogen and chlorine led to the discovery that the patient was deliberately throwing away a portion of the urine and fæces, so that results were obtained similar to those of Moraczewski, showing a retention of nitrogen and chlorine, at the same time an appreciable loss in body weight being observed. Such results being obviously incorrect, for a period of six days patient was carefully watched and a fresh series of experiments showed a nitrogen consumption of 48.6 grams and a nitrogen loss of 54.2 grams.

At the same time 36.1 grams sodium chloride had been consumed with the diet and 34.2 grams excreted in the urine. Even these figures failed to afford a satisfactory balance, a loss of 5.6 grams nitrogen and a gain of 1.9 grams sodium chloride being scarcely comparable with the actual loss in body weight during this period of .75 kilo. One possible source of error, the secretions of the skin, will be considered at a later stage, but it must be concluded that cases of this type are not suitable for metabolism experiments, owing to the difficulty of controlling the loss which takes place continually from the surface of the ulcerating tumor. On the other hand, the 24-hour analyses may be made use of to compare the relative proportions of nitrogen, uric acid, ammonia, chlorine and phosphorus. The uric acid nitrogen was found as an average of the 45 days to be 2.1 per cent of the total nitrogen; the ammonia nitrogen 12.5 per cent; phosphorus 7.4 per cent and the chlorine 40 per cent of the total nitrogen.

*CASE VII.

P. G.; age 59; Polish.—Committed to Erie County Hospital March 14, 1904. Was found to be much emaciated; complained of inability to swallow solid foods but was able to take fluids. Examination with œsophageal bougies showed that there was some dilatation of the œsophagus and an obstruction at the cardiac opening. After several attempts, however, a moderately large bougie was passed into the stomach. He was kept under observation, and on May 21st a gastrostomy, typical Witzel, was performed. He was fed through the tube for about a fortnight, at which time the irritation in the œsophagus had so subsided that he was again able to swallow semisolid food with ease and some solid food. His condition steadily improved; he gained in weight and on June 15th tube was removed and shortly afterward the opening closed spontaneously. Patient's ability to swallow semisolid food and at times solid food remained unchanged until September, when he contracted lobar pneumonia, of which he died on October 5th.

The condition of the œsophagus on autopsy was shown to be slightly enlarged; there was no definite area of erosion or permanent stricture of the cardiac opening. The mucous membrane of the œsophagus was somewhat injected. The anatomical findings confirmed the clinical diagnosis of cardio-spasmus.

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*We are indebted to Dr. Gaylord of this Laboratory for above history and autopsy notes.

In view of the possibility that this was a case of cancer of the œsophagus a series of nitrogen and chloride determinations was carried out shortly after the operation had been performed. The patient's diet throughout this and subsequent experiments consisted of milk, with the addition of definite quantities of plantose (a vegetable albumen) and salt, meat broth and egg-nogs, which greatly facilitated the determinations of nitrogen and chlorine. The first series, *a*, as will be seen from the table, shows a distinct loss of nitrogen and fair equilibrium of chlorides. A heavy nitrogen loss at this stage must, however, be attributed to the shock of the operation and to the toxic effects of an infection which developed at the point at which the tube was introduced. A subsequent series, *b*, of nitrogen determinations carried out six weeks after the operation and previous to the development of pneumonia shows a very fair maintenance of nitrogen equilibrium. With regard to the chloride metabolism, it is interesting to note in series *a* that, whilst a heavy loss of nitrogen had taken place, probably owing to toxic influences, a very fair chloride equilibrium was maintained. There was no tendency to œdema, and the toxic influences referred to above apparently failed to exert such an effect upon the kidneys as to lead to a retention of sodium chloride.

TABLE VI.

Series a.

DAY.	Nitrogen of food.	Nitrogen of excreta.	NaCl of food.	NaCl of excreta.
1	12.5	15.7	5.5	4.8
2	11.4	18.6	4.2	4.3
3	12.3	16.6	6.3	6.4
4	12.8	17.7	4.3	5.7
5	12.6	16.9	6.8	6.9

Series b.

DAY.	Nitrogen of food.	Nitrogen of excreta.
1	14.0	14.3
2	13.6	10.4
3	13.4	15.9
4	13.9	13.3

Estimations of uric acid and ammonia as compared with the total nitrogen of the urine over an extended period showed very low uric acid and fairly high ammonia results, the uric acid nitrogen averaging less than .8 per cent of the total nitrogen, the ammonia nitrogen, especially during the toxic period, being as high as 10 to 15 per cent of the total nitrogen.

*CASE VIII.

L. L.; age 44; weight 150 pounds; married.—Born in the United States of German parentage. Retired butcher. No family history of cancer or tuberculosis on either side. No personal history of syphilis or intemperance. Patient enjoyed ordinarily good health until the year 1897, when he states that he had an illness of two months duration characterized by much pain in the region of liver and marked jaundice, indigestion and fever. No evidence of gall stones. In April, 1904, had pain in the right hypochondria, but no vomiting, belching or other gastric symptoms. From July 1st experienced considerable difficulty in swallowing solids, and some with regard to liquids; belched gas and had small regurgitation of food with considerable mucus, but without noticeable color, odor or taste. At this time he suffered from sharp epigastric pain, which was almost continuous, and at the same time from constipation. A physical examination revealed nothing abnormal as to liver, stomach, heart, kidneys or appendix. On July 26th the œsophagus was sounded. The largest sized bulbs entered easily to a depth of 29 cm. from the incisors. Size 26 (French) entered to a depth of 30 to 31 cm., varying according to force employed but could not be inserted lower than 31 cm. Size 22 passed the stricture with some difficulty and it was thus determined that the lower œsophagus was sufficiently large to accommodate this bulb below a point 33 cm. from the incisors. On August 8th an X-ray examination was made, but revealed nothing as to the cause of stricture. On October 11th an attempt was made under ether to inspect the stricture by means of the speculum, but on account of a stoop of the shoulders it was not possible to straighten the spinal column sufficiently. At various times œsophageal bulbs were passed corroborating the results of the first examination and showing neither increase nor abatement of the stricture. No blood nor tissue was at any time found, the microscopical examination revealing nothing but epithelial scales and food remnants. Patient had lost weight considerably previous to the 26th of July, on which date he weighed 150 pounds. The experiments in metabolism referred to later were carried out between the first of August and the middle of October, at which time he weighed 158 pounds, having gained eight pounds in the course of the experiments. A careful investigation reveals no history of tuberculosis, syphilis or traumatism including corrosion, and since cardio-spasmus can be ruled out, reasoning by exclusion the case is probably one of cancer of the œsophagus.

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* We are indebted to Dr. A. L. Benedict of this city for the above history of the case.

From the above history it will be seen that, as the nature of the obstruction of the œsophagus is not known, it can not be said positively whether a tumor is present or not. A series of nitrogen and chlorine equilibrium experiments were carried out in conjunction with work on the nutrition of patient and the results over an extended period are included, so that they may be compared with those obtained on the cases known positively to be cancer, Nos. II, III, IV, V and VI, with the normal individual case (I) and the case of cardio-spasmus (VII). By the addition of plantose (a pure vegetable albumen) to milk, in varying proportions, it was found possible to convey sufficient food to the stomach of the patient to bring about a gain of 6 kilo in weight in the course of three months. The first series of experiments was conducted with a view to determine the amount of plantose which could most suitably be added to milk and eggnogs in order to give the requisite amount of proteid to maintain the nitrogen equilibrium between the food and excreta. For this period patient's diet consisted of an eggnog once daily, and 250 c.c. of milk with the addition of 20 grams of plantose and 3 grams of salt, three times daily, with milk in addition according to the desire of the patient.

From Table VII, in which the results of this first period are recorded, it will be seen that the loss of nitrogen, averaging 14.6, is only slightly in excess of the nitrogen of the food, averaging 14.4, quantities fairly in accord with the weight of the patient. During this period the chloride equilibrium was not determined with any accuracy, the results indicating a slight tendency to salt retention.

During the second period the nitrogen of the food was diminished to an average of 10.9 grams daily, with the result that a distinct loss of nitrogen was suffered by the system, averaging 1.7 grams daily. The total nitrogen secreted in the urine and fæces, averaging 12.6 grams, is not, however, indicative of toxic influences leading to abnormal destruction of body proteids, a fact which is further confirmed by a relatively low uric acid nitrogen. During this period the chlorides were maintained at a fairly high level, no very considerable differences being observed, an average of .9 grams sodium chloride being retained in the system daily.

TABLE VII.

Period 1.

Nitrogen of food.	Nitrogen of excreta.
13.0	14.6
13.0	13.1
14.2	15.2
15.5	14.5
15.5	14.4
15.5	16.2

Period 2.

Nitrogen of food.	Nitrogen of excreta.	NaCl of food.	NaCl of excreta.
11.4	13.3	12.3	11.2
10.7	12.3	11.7	12.4
10.7	12.3	11.7	9.4

Period 3.

Nitrogen of food.	Nitrogen of excreta.	NaCl of food.	NaCl of excreta.
16.8	14.8	11.7	9.5
16.8	17.6	11.7	11.9
16.9	15.6	11.7	10.9
17.0	13.6		
17.1	14.6		

In the subsequent Period 3 the amount of proteid in the food was materially increased to an average of 16.8 to 16.9 grams daily, with the result that a distinct retention of nitrogen was to be observed. For the first three days of this period the nitrogen intake exceeded the loss by 2.5 grams and for the two following days by as much as 5.9 grams, but it was subsequently found possible to diminish the nitrogen content of the food to 15.5 to 16 grams, at which figure patient gained weight and showed a marked improvement, conditions which are seldom associated with the development of a malignant tumor. For the first three days of this period the chlorides were excreted in a perfectly normal manner. as much as 11.7 grams in the diet being accompanied by a loss of 11.1 in the urine. A determination of the uric acid nitrogen showed a uniform content of .9 to 1.0 per cent of total nitrogen throughout the entire period, a figure which is below that generally obtained by ourselves and other investigators in cases suffering from a malignant tumor. This evidence of the absence of toxic influences would not, however, in itself justify us in deciding against the probability of the presence of a tumor.

At this stage reference must be made to a source of error which has been ignored by practically all those who have devoted attention to work on metabolism. The secretions of the skin, whilst possessed of a very small solid residue in normal healthy individuals, may reach considerable dimensions under pathological conditions which necessitate a performance by the skin of a portion of the kidney function. The meager analytical data bearing on this subject to be found in the literature would indicate a normal loss of .1 to .2 grams nitrogen and .2 to .3 grams sodium chloride per diem, but records are to be found of quantities as large as .5 grams nitrogen and 1 to 1.5 grams sodium chloride having been excreted, under pathological conditions, by the skin. Whilst the sources of experimental error in such work are so enormous as to preclude the possibility of obtaining strictly accurate figures, it is perfectly conceivable that even larger quantities than the above might be removed in the space of 24 hours. In any case it appears probable that the loss of sodium chloride by this means is from two to three times that of nitrogen, and consequently would afford a partial explanation of the fact observed in the majority of our own cases, as well as in those of most previous investigators. that the ratio of sodium chloride to nitrogen is lower in the excreta than in the food consumed. Assuming a minimum loss of .1 grams nitrogen and .2 grams sodium chloride and a maximum of .5 grams nitrogen and 1 gram sodium chloride, it will be seen at a glance that whilst the huge discrepancies recorded by Moraczewski of 8 or 9 grams difference between the chlorides of the food and those of the urine and fæces would not be materially affected, such a quantity would go far to supply the deficiency of chlorides in the urine observed in certain of our cases.

This source of error may well be advanced as an explanation of the slight discrepancies frequently observed in the balances of body weight, nitrogen and chlorine intake and output, and the osmotic tension of sodium chloride retained in the system, which should involve a retention of water and consequently an increase of body weight. For example, in Case II the observed loss of 77.5 grams nitrogen and a retention of 25 grams chlorine, or 41 grams sodium chloride in a period of eight weeks, would be changed to a loss of 80.7 grams nitrogen and a retention of only 18.7 grams sodium chloride, assuming that a daily loss of .2 grams nitrogen and .4 grams sodium chloride had been suffered by the system through the skin secretions. These figures would correspond far more closely with the variations in weight of the patient, which show from first to last a gain of about half a kilo, presumably attributable to œdema. Such an explanation would remove any necessity for assuming an extraordinarily increased concentration of sodium chloride or diminished dissociation of that substance into ions in the body fluids and cells, the only other conceivable explanation of the discrepancies observed. In other cases in which the daily retention of sodium chloride averages from .5 to 1 gram it will be seen that the loss of this substance by the skin may produce an appreciable difference; it must, however, be said that in those cases in which the salt consumption is small any great loss by way of the skin is improbable.

The blood.—In view of the evidence afforded by some of the above cases that in the last stages of cancer a heavy loss of nitrogen resulting from the destruction of body tissue may be counterbalanced in its effect upon the body weight by a retention of chlorides leading to the formation of œdema, it seemed a matter of considerable importance to carry out analysis on the blood and body fluids of such cases to observe deviations from the normal. Whenever sufficiently large quantities of blood were procurable, estimations were made of the nitrogen, chlorine, phosphorus, the lowering of the freezing point and titrations to the end points of a series of indicators. Blood counts were carried out from time to time, but only as required for clinical purposes, since the very thorough work of Kronkiewicz on this subject, showing variations in reds from 1,800,000 to 6,000,000 and whites from 4,000 to 20,000, rendered further work in this direction superfluous. It is very much to be regretted that, owing to the risk of endangering the life of the patient, we were able to obtain blood in sufficient quantities in only one or two cases in which patient exhibited marked cachectic symptoms, and consequently it was seldom possible to perform all the analyses referred to above in addition to the tests for hæmolysins, etc., referred to previously in this report. We have, however, a series of analyses on cases in which tumors had reached considerable proportions and discrepancies in the nitrogen and chlorine equilibrium had already been remarked, and the results can scarcely be said to deviate from the normal to the extent that one would be led to expect from the literature. The nitrogen, chlorine and phosphorus results varied considerably, showing a slight tendency to diminished nitrogen and increased chlorine (see Table VIII), but scarcely to the same extent as did those of Moraczewski. Titrations carried out on the serum after separation from the clot showed with one exception results very little below the normal in alkalinity. N/50 acid was employed, and from the tabulated results in which the amount of acid required to neutralize 1 c.c. of serum to given end points are recorded, a comparison may be drawn between our cases and those of Rigler. This investigator observed a fall in the alkalinity, both of the blood as a whole and of the serum, in a series of diseases, reaching an acute stage shortly before death, and in case of recovery once more rising to the normal. Using lakmoid as an indicator, he found 1.8 to 2.2 c.c. n/50 acid was required to titrate 1 c.c. of normal blood serum, whilst in acute diseased conditions this figure sometimes fell as low as 1.2 and even 1.1. Our records, whilst slightly below the normal, never reached these figures. (See Table IX.)

Engelmann, in a paper on the freezing point of the blood of cancer patients, finds variations from .56, the normal, to .65 in inoperable carcinoma ventriculi. *We have at present examined only six cases, five of which lie within the normal limits from .56 to .60, one being slightly over the latter figure. We are not therefore able to bring forward any results in support of the generally accepted view that the osmotic pressure of the blood serum of advanced cancer cases is necessarily above the normal, but are rather inclined to consider such variations as attributable to deficient heart and kidney function. It is, however, our intention to deal with the question of blood analysis more thoroughly at a later date, making use of a series of cancer animals. Since, however, gross analyses are of little value in dealing with the disturbances in osmotic equilibrium of cancer-cells, owing to the

TABLE VIII.

Analyses of Blood of Cancer Cases.

	Nitrogen.	Sodium chloride.	Phosphorus.
Cancer of the breast.........	2.13	.48	.03
Cancer of the stomach.......	1.84	.47	.08
Cancer of the liver..........	2.24	.45	.035
Cancer of the stomach.......	2.30	.49	.04

TABLE IX.

Blood Serum (Cancer Cases).

	Phenolphthalein.	Rosolic acid.	Lacmoid paper.
Cancer of liver..............	—.2	.7	1.71
Cancer of liver and stomach.	—.4	.8	1.8
Cancer of stomach	....	.58	1.66
Cancer of intestines	....	....	2.2

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*Analyses on materials obtained at autopsies are, of course, excluded from these results.

great delicacy of such variations, we are devoting attention rather to the osmotic equilibrium of the individual cell and to the interchange of salt ions capable of passing through the cell walls in the hope of thereby throwing some light on the questions as to whether or no specific toxic influences exerted on the protoplasm of the cells are bringing about changes in their viscosity and permeability.

Whilst it is out of the question to summarize in any satisfactory manner the numerous isolated details brought out in studies in metabolism, and the average of a large number of results gives no idea whatever of the course actually taken in the establishment of any state of equilibrium, we have included a table showing the averages of the nitrogen and chlorides of the food and excreta for considerable periods of time in a series of cancer cases compared with the normal. Such a table is necessarily influenced to a certain extent by experiments carried out (in the course of the period, an average of which is presented) with a view to observing the effect of nitrogen or chlorine starvation or the administering of an excess of either of these substances. It will, however, enable us to recognize any extensive loss or gain of nitrogen or chlorine suffered by the system as the disease develops.

Case I, a normal individual, was submitted to partial proteid starvation and at the same time received widely varying quantities of sodium chloride. As might be expected a slight nitrogen loss was suffered by the body, whilst a marked tendency to the establishment of chloride equilibrium was exhibited.

In Cases II and IV, both carcinoma, in which cachexia had intervened, and the patients were suffering from partial proteid starvation and succumbed to the disease at the completion of the experiments, as well as in other cases records of which are incomplete, a marked loss of nitrogen and retention of chlorides was to be observed. At the same time it must be noted that the excretion of 6.7 grams nitrogen daily is very little above that of the normal individual in a state of starvation, and it does not indicate that the toxic effects of the tumor have led to an excessive proteid decomposition in the body.

Case III is remarkable when it is remembered that the patient's stomach and liver were riddled with carcinoma, and yet so slight an interference exerted upon the nutrition that a retention of nitrogen as well as sodium chloride in the course of our experiments was observed. One source of error unfortunately neglected was the loss of nitrogen and chlorine, which took place from the mouth and throat on expectorating after coughing and the employment of a gargle. It was our intention to repeat the experiments in question, but unfortunately the rapid decline in the state of the patient, followed very shortly by death, excluded the possibility of further investigation in this case.

Case V shows how little effect a rapidly growing sarcoma may exert upon the nutrition, and the nitrogen and chlorine equilibrium of a patient, a practical balance of these bodies being obtained for a space of twelve days.

Case VI, a markedly emaciated and cachectic case of epithelioma of the uterus, showed in the course of our experiments a loss of nitrogen and a retention of chlorides. The differences observed were very slight, a fact which may possibly be attributed to experimental errors resulting from the difficulty of controlling a patient of this type.

In Case VII (cardio-spasmus) as the result of an operation and subsequent infection, the loss of nitrogen in the first period is very considerable, whilst a fair equilibrium of chlorides is maintained. In the subsequent period, patient having recovered from the infection, the nitrogen balance is about normal.

In the last case recorded in the tables, suffering from stricture of the œsophagus, the cause of which is unknown, whilst a nitrogen equilibrium is established on a daily consumption of proteid containing 14 grams nitrogen, a smaller quantity in the diet leads to a loss on the part of the body and an increased quantity to retention of nitrogen. There is possibly a slight tendency to retain chlorides in this case.

We have in Table XI included some of the cases investigated by Müller and Braunstein, from which it will be seen that whilst Müller records a daily loss of nitrogen exceeding 5 or 6 grams in six cases out of eight, Braunstein, whilst obtaining a fair equilibrium in the majority of cases, records one in which as much as 10 grams nitrogen was lost daily through the urine and fæces in excess of that present in the diet. The nitrogen results obtained by the latter investigator correspond fairly well with those which we have obtained; but whilst we have noted a distinct retention of sodium chloride in all cachectic carcinoma cases, he finds a loss in four cases out of five.

TABLE X.

CASE.		Nitrogen of food.	Nitrogen of excreta.	Sodium chloride of food.	Sodium chloride of excreta.
I Normal	a	13.0	13.4	11.4	11.9
	b	11.6	13.2	13.1	13.5
II Carcinoma of stomach and pancreas	a	6.5	6.5	1.85	1.8
	b	5.5	6.7	1.6	.9
	c	4.3	6.7	1.9	.45
III Carcinoma of œsophagus involving stomach and liver		9.4	8.5	5.4	4.45
IV Carcinoma of kidney		4.5	6.8	2.1	.4
V Sarcoma of skin and connective tissue		11.5	11.1	7.8	8.1
VI Epithelioma of uterus, etc.		8.1	9.0	6.0	5.7
VII Cardio-spasmus	a	12.3	17.1	5.4	5.6
	b	13.7	13.5		
VIII Œsophageal stricture (cause to be determined. See page 97)	a	14.4	14.7		
	b	10.7	12.6	11.9	11.0
	c	16.9	15.2	11.7	10.8

TABLE XI.

CASE.	Nitrogen of food.	Nitrogen of excreta.	Sodium chloride of food.	Sodium chloride of excreta.	
V Carcinoma ventriculi	3.9	11.4	......	......	Müller
VI Carcinoma ventriculi	3.45	12.0	......	......	"
VII Carcinoma ventriculi	2.45	9.1	......	......	"
VIII Carcinoma pancreatis	1.7	6.0	......	......	"
IX Carcinoma mammæ	9.1	10.4	......	......	"
I Carcinoma œsophagi	7.7	6.5	5.1	5.6	Braunstein
VI Carcinoma œsophagi	7.7	7.8	7.0	7.8	"
VIII Carcinoma œsophagi	7.2	10.3	4.4	3.7	"
IX Carcinoma ventriculi	8.8	10.6	7.3	8.5	"
X Carcinoma œsophagi	4.2	14.9	.690	.794	"

Moraczewski's results are exactly the reverse of those obtained by Müller and Braunstein. In one case of carcinoma of the uterus he records a retention of 43 grams chlorine and 52 grams nitrogen, the patient merely gaining one kilo in weight. In a case of carcinoma of the ventricle he observed a chlorine retention of 82 grams with a slightly larger variation in weight. In Case VI, carcinoma of the ventricle, with one kilo increase in weight in the course of eight days, a retention of 75 grams nitrogen and 45 grams chlorine was observed. Such proportions are obviously impossible. An increase of merely one kilo in body weight could not conceivably be associated with a retention of quantities of chlorides and nitrogen as large as those recorded in the first and last examples. One must, however, conclude from his publications that he considers his cases afford evidence of a strong chlorine and nitrogen retention, whilst Müller is convinced that the loss of nitrogen is in the majority of cases extremely heavy. Braunstein finds in one case only out of ten any considerable loss of nitrogen, in the remaining cases a slight loss in body weight was observed. Our results differ considerably from either those of Müller or Moraczewski and are more in accord with those of Braunstein. We are inclined to believe that in all cachectic carcinoma cases a loss of nitrogen and a gain of chlorine may be looked for, especially where there is any tendency to œdema, but we have not in our experience met with any such huge differences in the intake and output either of nitrogen or chlorine as are to be found in the tables of either of the three investigators referred to above.

It must be confessed that none of our own cases affords an absolutely satisfactory balance of the various factors referred to in the introduction, change of body weight, loss and gain of nitrogen and chlorine, increase in weight of tumor, loss of tissues and production of œdema. It may, however, safely be said that when allowance has been made for a possible slight loss of nitrogen and chlorine by way of the skin and mouth, and for the other sources of experimental error, all of which tend in the same direction, viz: to an apparent diminution of the nitrogen and chlorine secretions, a fair balance is to be struck in all cases in the metabolic equilibrium. Whilst there is still a margin of chloride retention which would lead one to suppose that the excess chlorine held in the body can not be accounted for exclusively on the basis of increased fluid content, still the differences are not nearly as large as in Moraczewski's cases, and a slightly increased concentration of sodium chloride in the tissues associated with a decreased dissociation of that substance so as not unduly to disturb the osmotic equilibrium, might afford the necessary explanation. Unfortunately for this theory, we have not been able to obtain chemical evidence of any marked changes in this direction in the blood and tissues; but it must be remembered that existing methods of handling such a problem are of necessity crude and the changes to be investigated extremely delicate.

As regards the effect of increasing the quantity of chlorides in the diet and the effect produced by this means on the œdema of the patient, it must be said that whilst normal individuals show a tendency to establish a chloride equilibrium with very great readiness in the space of from 24 to 48 hours, being capable of consuming large quantities of chlorides above the normal without any marked changes in the blood and tissue, cachectic cancer cases, especially those in which the kidneys are deficient in their activity, are incapable of reacting even to a small increase in the amount of salt, marked œdema resulting from any such increase, which only disappears on once more reducing the amount present in the food. For details regarding the effect on the body weight and the secretion of metabolic products brought about by variations in the amount of chlorides in the diet, reference must be made to the analytical results recorded under each case.

The great significance of the role played by soluble chlorides in the processes of oxidation and elimination of waste products can not be overlooked, and we are not inclined to agree with Braunstein in assuming that the increase or decrease in the secretion of salt is simply a question of the amount of water retained in the system with which a certain amount of salt would normally be associated. We are inclined rather to look upon the water as being retained in conjunction with the salt, which in its turn is possibly prevented from proper diffusion by reduction in the permeability of membranes and by its possible association with products of metabolism. For the relative proportions of ammonia, uric acid and other nitrogenous constituents of the urine, phosphates, etc., reference must be made to the individual cases, or to a subsequent article in this report, in which this question is dealt with more in detail. Whilst increased secretions of uric acid and ammonia in proportion to the total nitrogen are frequently observed and assumed to indicate respectively disintegration of tissue rich in nuclein and faulty oxidation, it must be borne in mind that variations in the nature of the food consumed can bring about very marked changes in the proportions of these substances, as may be seen in Cases VII and VIII.

In conclusion it must be said that whilst work of this nature affords considerable evidence of the presence in the system of toxic bodies capable of seriously interfering with the nutrition of the patient, there is no positive evidence that we have to deal in cancer with toxins of a specific type, such as are invariably associated with the course of development of diseases caused by bacteria and other recognized parasites. The presence of nitrogenous suboxidation products resulting from some interference with the metabolism of the cells may well exert an accumulative effect, and as the disease progresses cause all the symptoms with which we are familiar in cancer cachexia.

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Chemical Examinations of the Urine as a Means of Diagnosing the Position of a Tumor and Observing the Course of its Development.

By G. H. A. Clowes, Ph. D.

A paper dealing with this subject and summarizing the results obtained by previous investigators was published by Blumenthal in the report of the Krebsforschung Komité, 1902. The conclusions arrived at by this author possess a considerable amount of value, especially in view of the difficulties that are associated with a thorough investigation of the urine. As the result of analyses carried out on a series of cancer cases we are in a position to confirm for the most part the results recorded in his paper, but in certain cases variations worthy of note have been observed. For the literature reference must be made to the original article. In a previous portion of this report the question of retention of chlorides in the system has been completely dealt with, and it is therefore only necessary to repeat the statement that in cases of advanced carcinoma, where accurate analyses have been carried out on the diet and urine, a considerable loss of nitrogen and retention of chlorides has been observed. It has been suggested by Schöpp that the chlorine apparently retained in the system is really removed from the surface of ulcerating tumors. This explanation was not, however, applicable in any of the cases under observation, with the exception of Mrs. H., in which it received due consideration. That the total chlorides in the urine are so considerably diminished as to be present in proportions as low as one per cent to one-half per cent of the total nitrogen, or even to entirely disappear, whilst the proportion of chlorine to nitrogen in the food is still as 1 to 3, is a matter of daily observation, but it must be borne in mind that the extremely low secretion of chlorides observed by early investigators might frequently be attributed to the diminished proportions of chlorides contained in a milk or fluid diet as compared with a solid diet. In the cases which have been under observation in this Laboratory, so long as the chlorides in the diet were maintained at a normal level of not less than 3 or 4 grams chlorine per diem, and so long as the individual was capable of assimilating solid food, the proportions of chlorine excreted in comparison with that of nitrogen seldom fell below 50 per cent, and it was only when the fatal termination of the disease was approaching that such figures as 2 per cent, 1 per cent and even less were recorded. In fact, the results correspond fairly closely with those observed by Müller, etc., on starving individuals. The explanation offered by this author that the organ proteids which are relatively poor in chlorides were undergoing decomposition in place of the circulating proteids needs further support before it can be accepted.

In six cases in which exact determinations of phosphoric acid in comparison with nitrogen were carried out for a considerable period the amounts of phosphoric in proportion to nitrogen were found to be 6.8, 6.8, 7.2, 7.5, 7.7 and 7.8 per cent, giving an average of 7.3, which corresponds fairly closely with the highest results, 7.3, obtained by Müller, and is slightly in excess of the normal. As regards various nitrogen compounds, we have already dealt with the question of the total nitrogen excreted in comparison with the amount assimilated, and have found that when due allowance is made for all possible sources of waste the amount lost is usually slight and sometimes considerably in excess of that present in the food. The proportions of the various constituents differ widely. Whilst normal urine may be said to contain from 90 to 95 per cent of its nitrogen as urea, about 1.0 to 1.5 per cent as uric acid, 1.5 to 4 per cent as ammonia and the residue as extractive and amido acid nitrogen, similar proportions have been found to obtain in the very early stages of development of those cases of cancer in which the tumor produced no direct effect upon the metabolism and did not interfere with the nutrition. In all cases in which a marked cachectic condition had set in and where the nutrition of a patient was seriously impaired, either by toxic effects or the mechanical development of the tumor, results such as the following were to be observed: Urea nitrogen from 85 to 90 per cent; ammonia nitrogen from 6 to 12 and even 15 per cent; uric acid nitrogen from 1.8 to 2 and even 3 per cent, as compared with .9, 1.0, to 1.3 in other cases. It can not be too strongly emphasized that such results were only obtained in those cases in which inanition, accompanied by the pathological destruction of proteids, had reached an advanced stage. Also it must be remembered that the nature of the diet has a great effect on the uric acid secretion.

Halpern, in fractionating the nitrogenous constituents of pathological urines, presents four cases of cancer, two of them being carcinoma of the stomach with metastases in the liver, one carcinoma in the region of the porta hepatis and the fourth a carcinoma cardiæ. In the first case, carcinoma of the stomach with metastases in the liver, a low urea accompanied by high purin body nitrogen (including uric acid) high ammonia and normal extractive nitrogen were recorded. In the remaining three cases the proportions of the various constituents were not far removed from the normal, the extractive nitrogen being, however, rather high but not in any sense comparable with the high results obtained by Töpfer, Setti and Gumlich for extractive nitrogen, reaching figures from 10 to 23 per cent. We have not in the course of our work met with any such great deviations from the normal as are recorded by these authors, and in one case, carcinoma of the stomach with metastases in the liver, in which no very serious interference with the nutrition was to be observed, practically normal results were recorded for ammonia and uric acid.*

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*Experiments on a series of cases fractionating carefully the nitrogenous constituents of the urine are being carried out in the Laboratory at the present time and will be reported upon when completed.

We have been unsuccessful in an attempt to confirm the observation of Griffiths, who claims to have isolated a specific alkaloid having the formula $C_8H_8NO_2$ from cancer urine by extracting with ether in urine previously evaporated in vacuo and treated with alkali. Our experiments resulted in the separation of kreatinine, traces of xanthine bases and other normal urinary constituents, but not of any compound which could be looked upon as specifically associated with cancer. The observation made by Bouchard that the urine of cachectic cancer patients is more toxic than the normal was confirmed, but this may well be attributed to the larger proportion of normal sub-oxidation products; and, as stated above, the search for any specific ptomaine has been unsuccessful. A large proportion of cancer cases appear to succumb rather to starvation than to any toxic effects exerted directly by the tumor in its development. Any interference with the metabolism of the patient naturally leads to the production of toxic products which induce cachectic symptoms, and, as Müller observed, the noticeable difference between the loss of nitrogen suffered by the normal starving individual and one dying of starvation as the result of interference of a tumor is a slightly more rapid destruction of body proteid and elimination of nitrogen in excess of food consumed per kilo of body weight in the latter case over the former.

The secretion of phenol and indican in the urine in cases of stomach and intestinal cancer frequently reaches from two to four times the normal, but we have seen one case in which a stomach carcinoma failed to lead to the production of any increase in the urine indican. In two cases in which the pancreas was involved we failed to observe any indications of sugar secretion, and are not therefore prepared to consider the absence of sugar in the urine as sufficient proof that the pancreas is not involved.*

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*Since the completion of this paper a publication has appeared by Cammidge on the presence of oxidation products of glycerine in the urine and the diagnosis of pancreatic disturbances and of cancer of the pancreas. We are at the present time testing all cases for this reaction, but have not a sufficient amount of material to justify any expression of opinion regarding the value of this reaction for diagnostic purposes.

Destruction of the tissues rich in nuclein, the kidneys, liver, spleen, pancreas, etc., usually leads as might be expected to a slight increase in the proportion of uric acid and phosphates as compared with nitrogen, seldom amounting, however, to an addition of more than .5 per cent to the uric acid nitrogen and .5 to 1 per cent to the phosphates, as compared to the total nitrogen of the urine. Albumin occurs as would be expected in all cases in which the kidneys are involved, and frequently in cases in which the tumor is breaking down, but we have not been able to confirm the observation of von Noorden that it is present in appreciable quantities in over 70 per cent of all cancer cases.

Lactic acid is found occasionally in the urine in cases in which the liver or uterus is involved. We found it continually in one case of cancer of the uterus, but on the other hand it must be stated that in two cases where large metastases were found in the liver at the autopsy no lactic acid had been separated from the urine at any stage of the investigations carried on whilst the patients were under our observation. We have observed the presence of beta-oxybutyric acid and aceton in the urine of patients in a comatose condition, just as is the case in diabetes, and it is interesting to note that in one case at least this phenomenon was associated with a considerable diminution in the apparent alkalinity of the blood. Ehrlich's diazo reaction is, according to Blumenthal, invariably associated with ulcerating tumors. We have obtained a diazo reaction in a very marked degree in two or three cases in which ulceration had set in, but not invariably.

Whilst it would be out of the question to attempt to establish any hard and fast rules whereby a diagnosis could be effected by a study of the urine, considering the limited state of our knowledge at the present moment, a careful consideration of the various factors suggested by Blumenthal and for the most part confirmed by ourselves, has made it possible on one or two occasions to determine the exact location of the tumor. It is, however, well to bear in mind that we have very little evidence of direct activity on the part of the tumor cells leading to any specific effect upon the nature and proportion of the products excreted in the urine, the changes observed being for the most part those which would be induced by some interference with nutrition and the normal processes of oxidation, and also such as would be induced by secondary bacterial infections. A very extensive series of experiments carried out with a variety of group color reagents and also a series of biological tests for specific products which might be definitely associated with tumor cells have so far been resultless in so far as the urine is concerned, but there appears to be no reason why a continuation of work in this direction might not lead to some means of effecting an early diagnosis of cancer.

LITERATURE.

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On the Secretion of the Stomach in Cancer as Compared with the Normal.

By G. H. A. Clowes, Ph.D. and E. W. Jeffcott, Ph.B.

As a part of the routine work of this Laboratory in the course of the last two years upwards of 200 stomach contents have been submitted to a detailed chemical analysis. Whilst our primary object has been the early recognition of gastric cancer, the materials at our disposal, including as they do some 30 pathologically diagnosed cancer cases, may be utilized to throw some light on the problems of impaired nutrition and disturbed chemical equilibrium associated with this disease.

In a previous paper, an abstract of which has been included at the end of this report, the application of volumetric methods to the analysis of peptic digests has been discussed in detail. The use of various indicators for the direct estimation of acids and alkalies will not therefore be further referred to in this paper, except in so far as the normal deviates from the pathological, and also to make comparisons between the rapid volumetric methods usually employed in clinical laboratories, and the accurate but more tedious gravimetric methods which are only available in a well-equipped chemical laboratory.

An attempt has been made to select the most accurate analytical methods and by their application to a series of normal and pathological cases to throw light on the following problems:

1. With given test meals to determine the relationship, if any, existing between the amount of hydrochloric acid secreted and the total of nitrogenous products brought into solution through the action of pepsin on readily precipitated proteids.

2. On the fractionation of the above products of proteid hydrolysis by means of a series of precipitants and the relationship, if any,

existing between such fractions and the titration results. Also the investigation of the value of the phosphotungstic and tryptophan tests for diagnosis of cancer.

3. Regarding the direct secretion of sodium chloride, phosphates, etc., as well as hydrochloric acid, and the possible conversion of hydrochloric acid into sodium chloride through interaction with the sodium salts of organic acids.

4. On the osmotic pressure of the stomach contents at various stages of digestion; the possible role played by physico-chemical phenomena in the mechanism of secretion, and the extent to which toxins or other poisons acting on the cell protoplasm could interfere with the normal state of chemical equilibrium, resulting in an entire or partial suspension of the acid secreting function, or the reverse.

Analytical methods employed.—It seems advisable at this stage to give a brief outline of the analytical methods we have employed so that no confusion may arise:

Volumetric titrations whenever possible on unfiltered as well as filtered contents were made as follows:

Phloroglucinvanillin drops to faint pink end point on hot porcelain plate.

Alizarin to first color change, to faint red; occasionally when two figures are given, to purple.

Phenolphthalein to first pale pink.

Dimethyl-amido-azo-benzol, lakmoid and Porrier's blue were also employed occasionally.

For details reference must be made to abstract.

Estimation of phosphates.—The method at present employed in estimating acid phosphates was also found to be extremely faulty. In order to obtain an estimate of the actual amount of phosphates present and of the effect which they produce upon the titration, use was made of the two following points: (1) that the salt NaH_2PO_4 is converted into Na_2HPO_4 between the alizarin and phenolphthalein end point; and (2) that the salt Na_2HPO_4 may be converted into Na_3PO_4 or its equivalent $Ba_3(PO_4)_2$ between the phenolphthalein end point when that indicator is used alone and in the presence of barium chloride and excess alkali. And since it was shown that two of the three hydrogen atoms of the phosphoric acid are neutralized previous to the phenolphthalein end point in titration and one atom previous to the alizarin end point, allowance may be made for the phosphates by deducting the mean of the result obtained above from the alizarin end point and twice that quantity from the phenolphthalein end point.

The working method employed in all cases to which reference is made in this article is as follows: Filtered stomach contents (25 c.c. if possible) evaporated with a few drops of weak alkali, ashed, extracted with weak acid, filtered, boiled to drive off CO_2, made alkaline and boiled with pure n/10 NaOH to drive off ammonia, made up to definite volume and titrated from phenolphthalein to alizarin and from phenolphthalein to the same indicator after boiling with an excess of alkali in the presence of barium chloride.*

It is needless to say that the assumption of Töpfer that the period of titration from dimethyl-amido-azo-benzol to alizarin is attributable principally to acid phosphates, is incorrect.†

Estimation of chlorides.—In order to obtain accurate data regarding the excretion of hydrochloric acid and chlorides, it was found necessary to evaporate and incinerate the filtered and unfiltered stomach contents in all cases; and also for comparison's sake, to follow the same proceeding with a test meal, the duplicate of that which had been given to the patient. The following estimations were made in all cases in which there was sufficient material at our disposal; a slight modification of the methods of Martius and Lüttke being employed:

a. Chlorine present in the form of neutral inorganic salts other than ammonia by evaporating 10 c.c. of stomach contents and ashing without the addition of alkali, extracting with boiling water and estimating the chlorine, either gravimetrically, as silver chloride in a previously weighed Gooch crucible packed with asbestos, washing with nitric acid, water, alcohol and ether respectively and drying at 100°; or, volumetrically, by adding to the aqueous extract of ash an excess of n/10 solution of silver nitrate and titrating the unused silver by means of a standard solution of potassium sulpho cyanid, using ferric sulphate as indicator.

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*Am. J. of Pharmacy, vol. 75, Feby. 1903.

†It must be said that the presence of any considerable quantities of phosphates in a test meal is likely to materially affect the titrations, analyses, etc., and is therefore to be avoided whenever possible.

b. The estimation of total chlorine present in the form of inorganic salts of the alkalies, as ammonium chloride and as free or combined hydrochloric acid by addition of excess of dilute sodium hydrate, evaporation, ignition in a platinum crucible as in *a*, subsequent estimation of the chlorine as described above. An alternative gravimetric method which yielded almost identical results consisted in treating a definite quantity of the filtered stomach contents with fuming nitric acid in the presence of an excess of silver nitrate for some days until organic matter was destroyed, diluting with water and filtering through a Gooch crucible as described above. This method gives results almost equal to those obtained in a Carius tube and slightly higher than those obtained by the method previously described, possibly due to the fact that the evaporation and ignition of a carbonaceous residue in an open platinum vessel always leads to a slight loss of chlorides, even though the greatest precautions may be taken not to carry the process of ashing too far. Or a slight difference may be attributable to the inclusion of a very small quantity of organically combined chlorine which would be lost in all probability in the first process but absorbed by the silver nitrate in the second. In any case the loss is so slight that it may be ignored in the physiological chemical work in which the experimental error is necessarily higher than in that of a purely chemical nature.

c. In order to obtain an estimate of the influence attributable to ammonium, a body which seldom occurs in fresh stomach contents in any considerable quantity, an additional portion of 10 c.c. of the original stomach contents was neutralized exactly with n/10 alkali to the phenolphthalein end point, evaporated, ashed and treated as above.

It will thus be seen that by the above process of ashing stomach contents, extracting chlorides and estimating them either volumetrically or gravimetrically, we have obtained from *a*, chlorine present as inorganic salts (not including ammonia); from *c*, chlorine present as inorganic salts + chlorine present as hydrochloric acid free and combined; from *b*, chlorine present as inorganic salts, as hydrochloric acid free and combined and in the form of ammonium chloride. By subtracting *a* from *c* we have the total hydrochloric free and combined with proteids. By adding *a* to *b—c* we have the total chlorine present in the form of salts of the strong alkalies and ammonia.

d. An effort was also made to estimate the chlorine present as free hydrochloric acid by treating with barium carbonate, filtering and washing the residue and estimating the amount of barium which had passed into solution, the equivalent being assumed to be a measure of the actual free hydrochloric acid. Some of the results obtained by this method have been recorded but it is inaccurate, and since for reasons which will be referred to later it appears probable that the passage from absolutely free to entirely combined hydrochloric acid is not sharp but gradual and is a question entirely dependent upon the equilibrium of the chemical system concerned, we have not thought it worth while to continue this series of experiments.

Nitrogen.—Nitrogen was estimated in all cases in the filtered stomach contents, the same solution being employed as in the experiments enumerated above.

a. Duplicate quantities of 5 or 10 c.c. were employed for the estimation of total nitrogen by the Kjeldahl process, potassium sulphate being used to raise the temperature.

b. Ten c.c. rendered slightly acid to phloroglucinvanillin drops, if not already so, boiled and filtered and nitrogen estimated in filtrate.

c. Ten c.c. saturated with excess of zinc sulphate crystals, filtered and nitrogen estimated in filtrate.

d. Ten c.c. precipitated with tannin tartaric acid solution, recommended by Effront, filtered and nitrogen estimated in filtrate.

e. Ten to 20 c.c. of the filtered stomach contents were warmed, treated with an equal quantity of hot but not boiling solution containing 20 per cent phosphotungstic acid and 2 per cent sulphuric acid, shaken, allowed to settle and filtered, precipitate being washed with a 10 per cent phosphotungstic acid, nitrogen determined directly in the filtrate by means of the Kjeldahl method.

Estimation of lactic acid.—A qualitative test for lactic acid was first performed by evaporating 10 c.c. of the stomach contents with a small quantity of hydrochloric acid to half its bulk. The solution was then extracted in a separating funnel with 10 c.c. of pure ether. The etherial extract after separating was allowed to flow on to the top of a 1 per cent aqueous phenol solution to which a drop of ferric chloride had been added. At the points of contact of the two fluids a yellow rim was formed in the presence of lactic acid, affording a strong contrast to the purple of the neighboring liquid. A complete transformation into yellow would follow on shaking the mixture provided any appreciable quantities of lactic acid had originally been present. In case the presence of lactic acid was established by this preliminary test, the exact quantity was estimated directly by means of the usual iodine and thio method.

Filtration of stomach contents.—The question as to whether the best results may be obtained with or without filtration of stomach contents is one which is frequently raised in the literature. When an Ewald test meal is employed with a sufficient quantity of water (250 c.c.) no very considerable difference is made in the titration and chloride results, and since it is impossible to estimate the nitrogenous constituents without filtration, it seems advisable to use filtered rather than the original stomach contents, especially in view of the fact that in the clear solution the end points of indicators are rather sharper. On the other hand, we have frequently encountered cases in which for some reason or other an Ewald breakfast was unsatisfactory, as, for example, when a gastrostomy had been performed and the patient was fed through a tube. When a soup meal consisting principally of vegetable proteids is employed, a very material difference is to be observed between the filtered and unfiltered stomach contents. Whilst the osmotic pressure as estimated by the freezing point remains practically constant, not varying by more than .02° C. before and after filtration and the total quantity of chlorine present in the form of acid + salts, estimated by gravimetric methods, is also fairly constant, the titration results show a great difference as do the figures indicating the proportion of salts to hydrochloric acid. In other words, as will be seen by an inspection of Table XII, a much larger proportion of sodium chloride passes through the filter than remains behind, whilst a large proportion of the hydrochloric acid is retained by the insoluble or partially insoluble proteids left on the filter. In one case, for example, whilst the total chlorine was 7.3 before and 7.5 after filtering, the chlorine present as salts was 2.1 before and 4.0 after filtration, giving differences of 5.2 and 3.5 for the available hydrochloric acid in the solution. These figures correspond with the phenolphthalein end points, which show 7.0 before and 5.1 after filtration, the difference being attributable in both cases to the influence of phosphates and organic acids, the freezing point meanwhile remaining practically constant, only changing from .39° to .40° C. Now, since such differences occur very frequently and reach even larger proportions, it must be borne in mind that filtered stomach contents never actually permit of an estimate of the total hydrochloric acid available for digestive purposes, and that when regular test meals containing large quantities of animal or vegetable proteids are administered, the error introduced by filtration may reach such considerable proportions as to entirely mask the presence of quite appreciable quantities of hydrochloric acid. More especially is this the case if, owing to weak pepsin, the proteids have not been reduced to a point at which they pass fairly readily through the meshes of an ordinary coarse filter paper. In one case the unfiltered stomach contents showed both volumetrically and gravimetrically 2.8 c.c. of hydrochloric acid free and combined with proteids, a quantity which, whilst below the normal, was very considerably in excess of that found in the filtrate, which was only 1 c.c. We have therefore made a practice of determining chlorides, phosphates, titrations, etc., in unfiltered contents,

TABLE XII.

Case		F P	Phenolpht. end point	Total Cl	Salts Cl	HCl by Diff.	Phosphates
I	Before filtration.	—.39°	7.0	7.3	2.1	5.2	1.6
	After filtration..	—.40°	5.1	7.5	4.0	3.5	1.4
II	Before filtration.	—.38°	7.5	6.9	1.8	5.1	1.5
	After filtration..	—.39°	5.9	7.3	3.0	4.3	1.4

and also in filtered when material permitted. Total nitrogen and its various fractions could only be determined in filtered contents, and consequently all figures used in comparison with nitrogen were estimated in the same solution.

1. *Relationship between hydrochloric acid secretion and peptic activity.*—A series of preliminary experiments with artificial peptic digests using varying quantities of hydrochloric acid has shown us that after allowing for soluble nitrogenous products brought into solution by the acid alone the degree of peptic activity is fairly proportionate to the nitrogen present either in the clear centrifuged solution or in the filtrate from which the insoluble residues have been removed, provided a sufficient dilution is maintained and all the working conditions are constant and the period of activity limited to three or at most four hours. We have therefore felt justified in considering the total nitrogen present in filtered stomach contents (after allowing for the soluble nitrogenous bodies present in the original test meal) as proportional to the peptic activity. The determination of this total nitrogen as against the available free and combined hydrochloric acid in some 200 normal and pathological cases (showing equivalents from 1 : 1 to 10 : 1, the large majority lying between 2 : 1 and 3 : 1) has convinced us of the correctness of the view held by Pawlow that no constant relationship obtains between the peptic activity and the hydrochloric acid secretion. The addition of further quantities of hydrochloric acid to pathological contents which showed an absence of free acid frequently led to a greatly increased peptic activity as estimated by the nitrogen brought into solution; a further proof that peptic activity and hydrochloric secretion do not bear any direct relationship to one another.

A method suggested by Benedict for estimating the degree of peptic activity by precipitating the filtered stomach contents with an excess of phosphotungstic acid and centrifuging has not been found to give satisfactory results on comparison with the nitrogen content of the same filtrates.

2. *Fractionation of products of proteid hydrolysis; phosphotungstic and trytophan tests.*—The digestion of proteids in a normal stomach by means of pepsin hydrochloric was supposed until recently to stop

short at the formation of albumoses and peptones. Boas, Schaeffer, Hammerston, Gamgee, Neumeister, Foster, Beilstein and Hughes fail to make any reference in their works to the formation of bodies representing further hydrolysis of the peptones until the latter substances are submitted to the influence of tryptic digestion. Effront recognizes the presence of proteids not precipitated by phosphotungstic acid. Zunz refers to substances which fail to give the biuret reaction with copper; also in a subsequent paper to nitrogenous bodies giving a biuret reaction which are precipitated by phosphotungstic and not by picric acid. Pfaundler in dealing with the end products of peptic activity concludes that after precipitating albumoses with zinc sulphate and peptones with phosphotungstic acid, a residue of nitrogenous products remains in the filtrate which fails to give the biuret reaction which, on hydrolysis with strong acids, may be split up into amido bases and amido acids, the bases thus formed being readily precipitated by means of phosphotungstic acid.

Lawrow and Langstein established the existence of crystalline end products of peptic digestion. It must, however, be borne in mind that such bodies were only obtained by them in vitro after long periods of incubation.

Reach in a paper on the digestive processes in the stomach, referring to the work of Zunz, who found 90 per cent of the noncoagulable nitrogenous products present in the stomach contents of dogs in the form of albumoses, started an investigation as to whether the limit of further digestion were 10 per cent or whether the residual bodies formed were immediately absorbed owing to their lower molecular weight. He carried on his experiments with dogs, and fractionating the contents after four hours he found from 30 to 56 per cent of albumoses, from 35 to 20 per cent of peptones and from 31 to 32 per cent of end products, according to the quantity of proteid in the original test meal. The albumoses were precipitated by saturating with zinc sulphate and the peptones by the addition of picric acid to the filtrate from the albumoses.

Emerson, working with Müller, investigated the products obtained by fractional precipitation of the stomach contents of normal individuals and arrived at the conclusion that saturation with zinc sulphate gave a precipitate of albumoses containing 51.5 per cent of the total nitrogen; that further precipitation with warm concentrated phosphotungstic acid gave an additional precipitate of peptones containing 31.4 per cent of the total nitrogen, and that the residual filtrate, amounting to about 17 per cent, representing a more advanced stage of proteolysis, was fairly constant. In the stomach contents of a cancer case he found figures differing very considerably from the above, the albumose fraction being 25 per cent, peptone 47 per cent and the phosphotungstic filtrate over 27 per cent. He claimed that not only were such results to be obtained from the actual stomach contents but that the cancer itself must contain an enzyme capable of carrying peptic digestion to a more advanced stage. Equal weights of cancer tissue, one without heating and the other heated to 80° C. were added to two fibrin hydrochloric acid pepsin digestion mixtures, with the result that after several days the albumose precipitate in the heated test was much larger and the phosphotungstic filtrate much smaller than in that which had not been heated. Toluol was made use of to retard the development of bacteria, but toluol is a comparatively weak disinfectant for a long digestion and apparently no filtration experiments through bougies were carried out, and even had this been the case, previous bacterial development in the tumor might have influenced the result.

We have wherever possible made use of Ewald breakfasts or plain proteid test meals in stomachs which had previously been washed out with distilled water. After removing and filtering the contents when the quantity was sufficient (in addition to the titrations and the determinations of chlorides, phosphates, etc., referred to in another section) the nitrogen precipitate by boiling was determined, the nitrogen precipitate on saturation with zinc sulphate, the nitrogenous bodies precipitated with phosphotungstic and those present in the phosphotungstic filtrate. In certain cases the precipitate with bromine and the precipitate by means of tannin-tartaric acid solution were also determined. The precipitate on boiling was usually from 3 to 5 per cent. That obtained by saturating with zinc sulphate under normal conditions from 40 to 55 per cent, a result which was frequently fairly in agreement with that obtained from the tannin-tartaric acid. The phosphotungstic acid precipitate was usually about 80 per cent, leaving the phosphotungstic acid filtrate containing between 17 and 20 per cent of the total nitrogen.

In the accompanying Table XIII the results of fractionating normal stomach contents according to the above scheme are recorded. Three cases are typical of many others and will suffice as an illustration of normal results. Column 1 gives in cubic centimeters of a $\frac{1}{10}$ N solution the total nitrogen in 100 c.c. of stomach contents. Column 2 the nitrogen content of the bodies which have been precipitated by boiling. Column 3 the nitrogen of the zinc sulphate precipitate obtained by saturating the solution with that salt and subsequently washing the precipitate with a saturated solution. Column 4 gives the nitrogen of the phosphotungstic acid precipitate obtained by treating 10 c.c. of the warm stomach contents with 10 c.c. of the 20 per cent phosphotungstic acid solution (containing 2 per cent of sulphuric acid) referred to above. Column 5 gives the results of a similar precipitation with phosphomolybdic acid and 6 the nitrogen content separately determined of the filtrate from the phosphotungstic acid precipitate. It will be seen that in the first two cases the portion precipitated by boiling is about 3½ per cent; by saturating with zinc sulphate over 50 per cent; by precipitating with phosphotungstic or phosphomolybdic acid over 80 per cent, the resulting filtrate being about 19 per cent. In the third case, whilst the precipitate on boiling with phosphotungstic acid was about the same as in the first case, the zinc sulphate filtrate was considerably smaller, being about 37 per cent. The titrations of the same materials in Case I showed for 10 c.c. 3.5 c.c. to phloroglucinvanillin drops end point;

TABLE XIII.

Normal case	1	2	3	4	5	6
I.........	147	5	79	119	120	27
II.........	160	6	85	129	127	30
III.........	144	5	53	117	118	26

4.4 c.c. to the alizarin end point and 7.1 c.c. to the phenolphthalein end point, the difference of 2.7 between the two latter corresponding very closely with the phosphotungstic filtrate, a point which will be referred to at a later stage. The end point 7.1 c.c. for phenolphthalein after deducting .6 c.c. attributable to phosphates corresponds fairly with 6.3 c.c. of available hydrochloric acid estimated gravimetrically. The hydrochloric acid present is consequently equivalent to rather less than a half of the total nitrogen, a relationship which very frequently obtains.

In Table XIV a series of the most widely deviating pathological cases has been selected and will suffice to prove that not only is the above relationship of normal cases by no means constant, but also that certain pathological cases do not necessarily deviate from the normal as might be supposed from the literature. Cases 1 to 5 were microscopically and clinically and subsequently by autopsy diagnosed as cancer of the stomach, and it will be seen at a glance that while three show a high percentage of phosphotungstic acid filtrate the remaining two are perfectly normal, being under 20 per cent. On the other hand, cases 6, 7 and 8, which are not cancerous, 6 and 7 being gastric ulcers and 8 a case of hyperchlorhydria, may be selected as illustrating an extreme deviation from the normal, phosphotungstic filtrates being 46, 24 and 65 per cent respectively. The appended figures showing the amount of hydrochloric acid physiologically available in the stomach are simply introduced to show that abnormalities may occur either in the complete absence or in the presence of an excess of free hydrochloric acid.

TABLE XIV.

	1	2	3	4	5	6	7	8
Total nitrogen	158	185	162	110	150	116	210	91
Nitrogen in zinc sulphate ppt	70	86	98	30	45	55	35	10
Nitrogen in phosphotungstic filtrate	25	47	17	36	37	53	47	60
Physiologically available hydrochloric acid	18	23	Nil	12	Nil	66	45	90

After determining the nitrogen of the phosphotungstic filtrate as against the total nitrogen in some 200 stomach contents after proteid or Ewald test meals, we are by no means inclined to agree with Emerson in assuming that a greatly increased phosphotungstic filtrate may be looked upon as indicative of cancer of the stomach. The largest recorded analyses of 60 and 70 per cent referred to above were obtained in cases of hyperacidity. On the other hand, figures in excess of the normal were obtained in certain cases in which hydrochloric was practically absent and the bacterial enzymes had evidently played an active part. Whilst normal stomach contents, generally speaking, show from 18 to 22 per cent after from two to three hours digestion, and cancer cases frequently show as much as 40 per cent, we have had six cases of cancer of the stomach confirmed subsequently by autopsies, which showed from 10 to 20 per cent phosphotungstic filtrate, and 2 cases of gastric ulcer have given results even in excess of the highest obtained in cancer. The same relationship is found to obtain in dealing with Ewald's tryptophan reaction, which will be referred to later.*

Whilst there does not appear to be any constant relationship between the available hydrochloric acid present in a gastric digest and the total quantity of nitrogen in the solution (which may be taken as a criterion of the peptic activity) other definite proportions occur frequently in the various nitrogenous fractions which can scarcely be overlooked. When digestion has been allowed to take its proper course in the presence of a normal proportion of pepsin and hydrochloric acid for at least two to two and a half hours, whilst the total range of titration varies within very wide limits, as was shown in a previous paper referred to above, that portion lying between the alizarin and phenolphthalein end points is, after allowing for phosphates, frequently about 18 to 20 per cent of the total nitrogen equivalent. The phosphotungstic filtrate is also, as stated above, frequently about 20 per cent of the total nitrogen; consequently a very close equivalence exists between the range from alizarin to phenolphthalein on titration and the phosphotungstic filtrate. (See Table XV.)

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*In considering the apparent tendency to advanced proteid decomposition in cancer as compared with the normal resulting in an increased phosphotungstic filtrate, it is interesting to note the result of some experiments carried out in this Laboratory in the winter of 1902, having in view the production of an anti-pepsin by means of rabbit serum. Von Dungern has obtained an anti-pepsin by making use of geese and failed to obtain any reaction from the ordinary laboratory animals. Our results agree entirely with his in the main, the sole difference being the tendency to an increased phosphotungstic filtrate in those cases of peptic digestion to which the immune serum had been added, in comparison with those containing normal rabbit serum. This would indicate either a stimulus of the secondary digestive function of the stomach or a neutralization of some normal constituent, the function of which would be to restrain any tendency to the continuation of peptic digestion beyond a certain point. It is conceivable, although scarcely probable, that such a body controlling the digestive processes and protecting the cells from the action of peptic and other enzymes may be entirely destroyed in certain cancer cases. We are not, however, inclined to the belief that this is actually the case, considering it far more probable that the observed results are due to secondary antolytic or bacterial enzymes.

TABLE XV.

Case	1	2	3	4	5	6	7	8	9	10	Avg.
Alizarin to phenolphthalein	25	19	30	26	43	31	17	31	21	35	.....
Phosphates	4	2	5	4	5	4	1	5	3	5	.....
Difference	21	17	25	22	38	27	16	26	18	30	24.0
Total nitrogen	113	107	131	120	228	135	80	127	104	144	128.9
Phosphotungstic filtrate	23	19	23	27	40	26	18	24	19	27	24.6

In this table are recorded the titration differences between alizarin and phenolphthalein, the phosphates determined independently which should be deducted from the previous quantity in order to form a fair estimate of the influence attributable to some specific basic group combined with hydrochloric in the solution. The total nitrogen and the nitrogen of the phosphotungstic filtrate from 100 c.c. of stomach contents were also recorded in their n/10 equivalents. It will be seen at a glance that the closest relationship exists between the corrected titration and the phosphotungstic filtrate; further, that both these quantities are slightly less than one-fifth of the total nitrogen.

This relationship obtains in about 40 per cent of the pathological cases investigated, but is subject to wide and unaccountable variations which preclude its utilization as a means of diagnosis. It has been stated previously that where hydrochloric acid is deficient, or from some other cause stagnation or bacterial decomposition has occurred, the widest range of variation of titrations is encountered, and at the same time the phosphotungstic filtrate is likely to rise considerably above 20 per cent, its normal value. But the titration fraction from alizarin to phenolphthalein is not necessarily affected at the same time as the phosphotungstic filtrate, very frequently one remaining directly proportionate and the other being greatly increased or diminished, and that without any apparent rule, certain cases of well-marked cancer of the stomach exhibiting normal proportions and others deviation in one direction or the other, more generally, however, in the matter of the phosphotungstic filtrate.

Whilst the residual phosphotungstic filtrate shows a certain relationship with the titration results, it has not been found possible to trace out any connection between the so-called albumose fraction, precipitated by zinc sulphate, and the portion between zinc sulphate and phosphotungstic acid supposed to represent peptones and amido bases and the titration results. The period from drops to alizarin which probably represents some form of weakly combined hydrochloric fails to show, as might be expected, any proportionality with any of the above mentioned fractions of the nitrogenous constituents and can not therefore be made use of as a means of differentiating between the normal and pathological, except in those cases in which an abnormal bacterial disintegration of proteids resulting in the liberation of free acid groups shows titration results out of all comparison with the mineral acids actually present.

The observation made by Winternitz, Malfatti and Glaessner independently that tryptophan, one of the final products of tryptic digestion, is to be found amongst the products of peptic digestion, led to the examination of normal and diseased stomach contents for this substance as a possible means of diagnosing pathological conditions. Since tryptophan has been identified by Hopkins and Cole as an indol-amino propionic acid and is generally associated with leucin, tyrosin and similar products of final proteid digestion, and possesses in common with the latter the property of not being precipitated from a weak acid solution by means of phosphotungstic acid, its presence or absence might be expected to correspond with the increase or decrease in the size of the phosphotungstic filtrate. Glaessner tried the effect of feeding patients with proteid test meals, removing the contents and testing with bromine water in the presence of small quantities of acetic acid. He experimented with 36 cases, 12 of which were cancer, and obtained positive results in only 4 cases, all of which were highly acid and only one carcinoma. The same author tested the effect of adding stomach contents of cancer cases to a normal peptic digest, obtaining a positive result in only one case. On the other hand, he found that the addition of the actual tumor material to a normal pepsin-hydrochloric digestion led in the course of 24 hours to a strong tryptophan reaction with bromine, other tissues, normal stomach membrane, liver, etc., giving negative results. Erdmann and Winternitz in discussing the proteinochrom (tryptophan) occurring in the stomach contents, recommend the use of chlorine instead of bromine on account of the disturbing effect of an excess of the latter substance. They failed to obtain the reaction in any normal or pathological cases other than cancer, except where stagnation of the contents had led to secondary decomposition. In carcinoma they obtained a positive reaction by the addition of chlorine water, drop by drop, to filtered stomach contents in the large majority of cases, even in the absence of bacterial decomposition.

In the course of the last twelve months we have tested on suspected cancer cases both with chlorine and bromine in weak acid solution. Whilst stagnant stomach contents, especially in the presence of a large excess of acid, will frequently give a faint reaction, as will stomach contents in which bacteria have suffered no check owing to the absence of free hydrochloric, we have never succeeded in obtaining any marked reaction in cases in which the stomach had been carefully washed with distilled water before administering the test meal.

We have further attempted to follow out the method made use of by Emerson for the phosphotungstic filtrate and Glaessner and subsequently Erdmann and Winternitz in studying the trytophan reaction, of adding cancer of the stomach tissue immediately after the operation to artificial peptic digestion mixtures which were allowed to stand over night in the incubator. Even then the phosphotungstic filtrate was not necessarily greatly increased and the tryptophan reaction was only obtained after incubation periods varying from 24 to 48 hours in some 40 per cent of the cancer cases. It was further observed that far the strongest reaction with chlorine was obtained when in the absence of disinfectants foreign organisms were allowed to develop whether the tissue employed were of a cancerous origin or not. We have not up to the present examined a sufficient number of cases to be justified in offering a positive opinion on the subject, but it can not be said that the evidence so far obtained would justify the assumption that the phosphotungstic and tryptophan reactions may be looked upon as indicating the presence in cancerous tissue of some peculiar enzyme capable of carrying proteid digestion to an abnormally advanced stage in the presence of free acids. The fact that the best reactions were invariably obtained in those cases in which advanced bacterial decomposition had already taken place inclines us to the belief that any such reaction is merely secondary and is not to be attributed to the direct influence of the carcinomatous cell and its contents. This is the more unfortunate since the existence of such a body capable of decomposing peptones with the formation of some of the final products of tryptic digestion might well explain the disturbances in equilibrium resulting in the suspension of hydrochloric acid secretion, etc., observed in cancer cases.

SECTION III. *Secretion of Chlorides, Hydrochloric Acid, Etc., in Cancer.*

Reissner in dealing with the estimation of hydrochloric acid in the stomach contents points out errors in practically all existing methods. He finally makes use of a modification of that of Martius and Lüttke. He decides after numerous experiments with free hydrochloric acid in the presence of chlorides, phosphates, peptones, organic acids, etc., to determine the physiological available hydrochloric acid by a method similar to that which we employ, the exception being that he titrated filtered stomach contents to the lakmus end point instead of phenolphthalein, and consequently found rather larger proportions of the chlorides present as ammonium salts. The method depends, as does that which we have employed, upon the assumption that in stomach contents, which are evaporated, charred and partially but not completely ashed, a point can be determined empirically at which the chlorides originally present will still be entirely retained and the hydrochloric acid which was present in the free state and combined with proteids or ammonia completely evaporated. Further, that by addition of alkali to a given end point one may include all the acid present in the free state and combined with weak bases present in the proteid molecule, without including that which was present in combination with ammonia; and that an excess of alkali will certainly include all chlorine originally present of whatsoever sort, provided too high temperatures are not employed in ashing. If the temperature is carried too far there can be no question that small quantities of chlorides are lost by direct vaporization; also that acid phosphates interacting with sodium chloride would eventually liberate hydrochloric acid. Reissner apparently attributes the low figures which he obtains partially to insufficient time permitted for the reaction to reach equilibrium after the addition of the exact amount of alkali required to neutralize the hydrochloric acid, or an excess. Also he suggests the possibility of neutral chlorides as calcium chloride interacting with acid potassium phosphate with the liberation of potassium chloride and hydrochloric acid, which is volatile. The actual state of equilibrium eventually established is entirely dependent upon the concentrations and the temperatures employed at various stages of the analysis. The simplest solution of such a problem is to avoid test meals containing any large quantities of phosphates, organic acids, ammonia, etc., and to make exact analyses of such test meals, a procedure which we have systematically adopted.

It has been noted in a previous section of this paper that the secretion of pepsin in the stomach is less readily influenced by the presence of a tumor than is that of free hydrochloric acid. Tests for the presence of free hydrochloric by means of phloroglucinvanillin drops, or of hydrochloric combined with proteids by the gravimetric methods referred to above may show absolutely negative results before the secreting cells have been seriously interfered with by the development of the tumor, a fact which excludes a purely histological explanation of the phenomena of impaired hydrochloric acid secretion. This extreme sensitiveness of the hydrochloric as compared with the pepsin secreting function of the cell is remarkable in view of the fact that mineral salts are chemically far less susceptible to changing conditions than are the enzymes and ferments. On the other hand, salts and mineral acids are electrolytes and consequently play a very important role in the establishment of osmotic equilibrium, and any disturbing influence in this direction may well be expected to affect them more easily than pepsin, a body which is presumably possessed of a large molecule and is incapable of playing any considerable role in osmosis.

Having observed in the course of our gravimetric work on the chlorides of the stomach contents that abnormally large quantities of sodium chloride are frequently found associated with very minute quantities of hydrochloric acid, the first point to be determined was to what extent sodium chloride might be secreted directly in the stomach in the place of free hydrochloric; also to what extent the hydrochloric when secreted might be directly neutralized by contact with the sodium salts of organic acids produced as products of suboxidation in the tumor itself. A long series of experiments was carried out on cancerous and non-cancerous cases as follows: Series of test meals were given containing definite quantities of sodium chloride, the greatest precaution being taken to remove all traces of chlorides from the stomach before commencing the experiments. After the usual period had been allowed to elapse the contents were removed, the residues washed out and the total quantity carefully analyzed. In practically all cases, both normal and abnormal, more sodium chloride was present in the stomach than had actually been introduced with the test meal. In normal cases this proportion seldom exceeded 5 to 10 per cent of the total amount of chlorine present, but in cancerous cases, especially those in which the tumor had already commenced to disintegrate, quantities of sodium chloride far in excess of those actually introduced and sometimes nearly equivalent to the normal proportion of hydrochloric acid were encountered. This was not, however, always the case, a total absence of hydrochloric acid being associated occasionally with an almost total absence of sodium chloride over and above the quantity actually introduced. Any neglect in the removal of the stagnant contents previous to administration of the test meal invariably showed a high proportion of sodium chloride, possibly owing to the increased volume of fluid affording an increased osmotic tension and increased secretion of salts and the presence of the sodium salts of organic acids which would react with any hydrochloric acid secreted. In one case, primary cancer of the oesophagus with involvement of the stomach and liver, a gastrostomy having been performed, the patient was fed entirely through a rubber tube. Such a case afforded an admirable opportunity of determining the effect exerted on the secretion of hydrochloric acid, sodium chloride and certain other mineral salts by introducing varying proportions of those substances directly into the stomach; the point being determined at which, owing to the high osmotic tension of the fluids introduced, no secretion was to be observed. It is not possible to employ an Ewald test meal in such a case, owing to the tendency of the bread, however finely divided, to block up the tube. A soup meal was therefore employed, determinations of nitrogen and chlorides being made in advance. The stomach was washed out with water twice before the administration of each meal. The meal was removed at the end of a period of an hour and a half and all residual material washed out with a fresh quantity of water. By determining the quantity of nitrogen present in the stomach contents it was possible to detect any loss which might have taken place through passage of the contents into the intestinal tract. Organic acids were not present in any large quantity, probably owing to the fact that all residues of meals left in the stomach after four hours were removed.

An inspection of Table XVI demonstrates fairly conclusively that sodium chloride, as such, must have been secreted directly by the cells of the stomach wall, especially in those cases in which no sodium chloride had been included in the diet. On the other hand, a large amount of sodium chloride in a test meal was usually associated with a loss of that substance in the stomach, and since the loss directly into the intestine was extremely small and could be allowed for, it must be supposed that chlorides actually found their way into the system by way of the stomach membrane.* The larger the quantity of hydrochloric introduced the smaller was the actual secretion of that substance and the larger the proportion of sodium chloride produced, indicating a possible reversing of the ordinary hydrochloric secretory functions, alkalies being in some way obtained

TABLE XVI.†

DATE	TEST MEAL			STOMACH CONTENTS		
	NaCl	HCl	Total	NaCl	HCl	Total
Oct. 8....	560	Nil	560	210	210	420
9....	500	"	500	225	150	375
10....	450	"	450	240	70	310
12....	315	"	315	137	140	277
13....	90	"	90	140	70	210
29....	420	"	420	237	87	324
31....	500	"	500	250	60	310
Nov. 3....	175	175	350	175	150	325
4....	280	200	480	230	170	400
5....	20	Nil	20	75	125	200
6....	10	180	190	90	160	250
7....	10	200	210	80	200	280
8....	35	Nil	35	80	120	200
9....	875	"	875	410	70	480
10....	10	290	300	100	160	260

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* This observation is in agreement with that of Bonninger, who found that the addition of large quantities of sodium chloride interfered with the normal secretion and reduced the action of pepsin on proteids.

† Table XVI gives a comparison of the proportions of sodium chloride and hydrochloric present in an exact duplicate of the original test meal, and of the sodium chloride and hydrochloric acid present in the stomach contents removed after an hour and a half. The materials in both cases were unfiltered. The figures represent cubic centimeters of n/10 silver nitrate solution equivalent to the total quantity of chlorine present either in the form of sodium chloride or hydrochloric acid, the estimation being carried out as described in the analytical section. The results observed may be converted into grams of chlorine by multiplying by the factor .00365. The series of experiments was conducted from October 8 to November 10, and at the autopsy of the case on November 25 it was discovered that almost the entire wall of the stomach was infiltrated with carcinoma.

from the stomach walls and a certain proportion of hydrochloric acid actually penetrating in the reverse direction.

The tendency to establish a state of equilibrium not only as regards the total volume and osmotic tension but also between the sodium chloride and the hydrochloric acid is very remarkable in spite of the fact that the infiltrating carcinoma had invaded a great portion of the secreting surface. This tendency is still to be observed in the later experiments carried out less than a fortnight before the death of the patient. In the early experiments the introduction of a large amount of salt was generally associated with the conversion of a considerable portion into hydrochloric acid, the amount of hydrochloric formed in this way greatly diminishing as the disease progressed. On November 3 and 4, when fairly balanced proportions of the sodium chloride and hydrochloric acid were introduced, the state of equilibrium was not very materially altered. On November 5 and 8 very small quantities of sodium chloride and no hydrochloric being introduced in the test meal, sodium chloride and hydrochloric acid were apparently secreted in the proportions of about 1:2. November 6, 7 and 10 practically no sodium chloride and large quantities of hydrochloric in excess of the normal introduced in the test meal resulted in a slight loss of hydrochloric acid and a considerable increase in the amount of salt. The high concentration of sodium chloride in the test meal on November 9 was associated with a considerably reduced concentration of salt in the removed stomach contents, and as on October 29 and 30 the introduction of a very large amount of salt with a high osmotic pressure seemed to result in the passage of chlorides through the stomach wall into the system and a slight formation of hydrochloric acid in the stomach either through secretion or the loss of sodium ions, the quantity of acid formed being considerably less than under normal circumstances when moderate or even extremely small quantities of chlorides were administered, as on November 5 and 8.

Through the whole series the tendency of this particular stomach to establish an equilibrium at about 250 units, or .9 to 1 gram of chlorine, is evident. The state of the patient rendered the completion of this series of experiments impossible, and the experimental errors, although reduced to a minimum, introduced sufficient variations to preclude the possibility of working out any mathematical relationships.*

If the test meal was permitted to remain a sufficiently long time in the stomach an osmotic equilibrium representing from .4 to .45° C. was generally established through the interchange of water and salts between the stomach contents and the system. An arrest of the process at the end of an hour to an hour and a half showed, both in cases of high and low osmotic tension of the original test meal, a tendency to the establishment of an equilibrium as near the average as possible, a finding which is more or less in accord with that of Pfeiffer but scarcely in agreement with that of Strauss, who considers that the secretory functions of the cells of the stomach membrane far exceed their tendency to absorb.

It would not of course be possible to base any final conclusions on a single case of this nature, but the observation that a diminished secretion of hydrochloric acid is frequently associated with an increased secretion of sodium chloride justifies the assumption that the failure of the cells to secrete a normal proportion of hydrochloric acid is only in part attributable to a diminished secretory function and may to a certain extent be accounted for as due to faulty or incomplete dissociation of sodium chloride in the blood and the cells concerned, probably due to the influence of sub-oxidation products and toxins produced in, and excreted from the tumor cells. This view tends to support the observation regarding the abnormal decomposition of proteids in cancer stomachs referred to in a previous section. It is also in agreement with the observed diminution in alkalinity and increase in osmotic pressure and sodium chloride content of the blood referred to elsewhere in this report, phenomena which are in all probability directly dependent upon some interference with metabolism resulting in incomplete and faulty oxidation of food stuffs.

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* Similar series of experiments covering shorter periods were carried out on other cases, the same tendency to establish a definite state of equilibrium between NaCl and HCl being observed. In certain cancer cases sodium chloride can apparently almost replace hydrochloric acid in molecular equivalence.

Leo Schwarz, in a valuable paper dealing with the question of chlorine starvation and the alkalinity of the urine, shows that a marked increase of the latter quantity is brought about by introducing sodium chloride and sodium bromide into the stomachs of dogs, bromine apparently functioning as an equivalent for chlorine, whilst nitrates and other mineral salts produce no marked effect on the state of equilibrium of the system.

Reissner concludes that a fairly uniform chlorine content of the stomach is generally to be observed, and that the absence or presence of free hydrochloric and hydrochloric combined with proteids is more or less dependent on the extent to which the original hydrochloric secreted had been neutralized with sodium. He evidently considers that the hydrochloric acid is secreted in any case and subsequently a portion of it neutralized. Our experiments would rather lead us to suppose that a certain proportion, in some cases a considerable amount, of sodium chloride was actually excreted as well as hydrochloric acid; and whilst we have frequently found abnormally large proportions of sodium chloride in cancer cases, as was stated above, other cases of cancer have also been recorded in which practically no hydrochloric acid or sodium chloride was to be found. Whilst in normal stomach contents the phenolphthalein end point, after allowing for phosphates, gives a fairly accurate estimate of the total available hydrochloric acid, as will be seen from Table XVII, this is in no sense true in pathological cases. As was stated in an article on indicators published recently and abstracted in this report, the discrepancies observed can scarcely be accounted for as due entirely to the presence of fatty organic acids and must partially be attributed to the abnormal decomposition of the proteids themselves.

It will be seen that in the first part of this table the available physiological hydrochloric acid estimated by gravimetric methods when added to the acid phosphates is about equal to the phenolphthalein end point, but this is in no sense the case in the cancer results recorded in the next section, although certain of them show very little discrepancy, whilst the big differences observed in the first five cases are in each case partially to be attributed to the influence of lactic acid. There is a residual difference which must be attributed to some type of proteid decomposition. In the last section giving non-cancerous pathological cases it will be seen that certain discrepancies are to be observed, which in view of the fair amount of hydrochloric acid present, can scarcely be attributed to bacterial decomposition.

Table XVII.

Non-Cancer Cases.

CASE	1	2	3	4	5	6	7	8	9	10	11	12
Free and combined HCl	7.7	11.1	9.0	9.4	8.0	5.6	7.1	3.6	2.6	4.1	6.6	6.4
Total phosphates	Nil	Nil	1.5	.6	.3	.4	.8	.8	.4	.4	.2	.6
Sum	7.7	11.1	10.5	10.0	8.3	6.0	7.9	4.4	3.0	4.5	6.8	7.0
Phenolphthalein end point	7.6	10.9	10.6	9.6	8.0	5.9	8.3	4.5	2.8	4.6	6.6	7.1
Difference	—.1	—.2	+.1	—.4	—.3	—.1	+.4	+.1	—.2	+.1	—.2	+.1

Cancer Cases.

CASE	1	2	3	4	5	6	7	8
Free and combined HCl	.0	.4	.8	.0	4.0	4.8	2.7	6.2
Total phosphates	.8	.6	.5	.2	1.0	.5	.4	.8
Sum	.8	1.0	1.3	.2	5.0	5.3	3.1	7.0
Phenolphthalein end point	8.8	6.8	4.9	1.1	10.0	5.4	3.3	8.4
Difference	+8.0	+5.8	+3.6	+.9	+5.0	+.1	+.2	+1.4

Pathological Cases Other than Cancer.

CASE	1	2	3	4	5	6	7	8
Free and combined HCl	14.4	8.0	11.0	6.8	7.3	6.1	3.6	2.4
Total phosphates	1.5	.8	1.1	.9	.6	.5	1.0	.4
Sum	15.9	8.8	12.1	7.7	7.9	6.6	4.6	2.8
Phenolphthalein end point	17.0	10.0	15.2	10.1	9.6	4.0	9.0	5.8
Difference	+1.1	+1.2	+3.1	+2.4	+1.7	—2.6	+4.4	+3.0

IV. *On the osmotic pressure of stomach contents.*—A series of freezing points made on 75 normal and pathological stomach contents gives results varying from .15° to .8° C. lowering of the freezing point. No direct relationship obtains between the freezing point of the stomach contents and the specific gravity, as is the case in urine, owing presumably to the large quantity of starch, etc., usually administered in a test meal. There is not the same difference to observe between the osmotic pressures of the contents of normal and cancer stomachs as is found in the titration values, presumably owing to the increased proportion of salts, sodium chloride and phosphates which are capable of replacing the free acid in maintaining the osmotic pressure in cases in which cancer has already made considerable advance.

The appended Table XVIII gives the comparison of the osmotic pressure of test meals and stomach contents after one and one-half hours, carried out on the same case as that referred to in previous Table XVI. The tendency to establish an equilibrium of osmotic pressure represented by a lowering of the freezing point of about .4° may be observed, all cases in which the osmotic pressure was higher that figure being diminished and when lower increased.*

TABLE XVIII.

Lowering of Freezing Point in Degrees C., Indicating Osmotic Pressure.

Osmotic pressure of meal . . .	1.27°	1.20	.93	.91	.67	.51	.36	.29	.27	.19
Osmotic pressure of contents after one hour and a half . . .	.87°	.79	.72	.67	.58	.47	.41	.39	.39	.34

SUMMARY AND CONCLUSIONS.

1. A series of exact gravimetric determinations makes it apparent that developing cancer of the stomach is generally associated with diminishing secretion of hydrochloric acid in that organ, a point being very frequently reached at which no free mineral acid is to be found.

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*A series of determinations of freezing point and conductivity in comparison with specific gravity, titrations and the amounts of certain chemical constituents of the stomach contents, blood and urine of a series of pathological cases are at present being carried out in this Laboratory and will be reported upon as soon as the material at our disposal is sufficient for that purpose.

2. This decrease in the proportion of hydrochloric acid is frequently associated with an increase in that of the neutral chlorides, and to a certain extent of the phosphates, the evidence inclining rather to support the assumption that the neutral salts are themselves secreted directly from the cells of the stomach wall, and not, as has been assumed by some authors, being produced as the result of interaction between hydrochloric acid normally secreted and the sodium salts of organic acids removed from the disintegrating tumor.

3. When proper precautions are observed in washing the stomach in advance, administering a normal test meal and removing the entire meal after a reasonable period of time has elapsed, no appreciable quantities of lactic acid are to be found except in those cases in which advanced secondary decomposition of the tumor mass has already set in.

4. The secretion of pepsin in normal proportion is maintained to a later stage than is that of hydrochloric acid, a fact which may frequently be demonstrated by the addition of acid to materials derived from a cancerous stomach, when a marked increase in digestion may be noticed on incubation.

5. The proportion of nitrogen present in filtered stomach contents which bears a fairly close relationship to the existing digestive activity is not in any sense proportional to the chlorine secretion.

6. The so-called phosphotungstic filtrate is usually about 20 per cent of the total nitrogen in well-digested mixtures, but may rise as high as 50 and 60 per cent in cases in which, owing to the presence of abnormally large quantities of hydrochloric or the entire absence of that substance, digestion has taken an abnormal course, and is by no means confined exclusively to cancer cases.

7. The titration of stomach contents by means of phloroglucinvanillin drops, alizarin and phenolphthalein with a separate estimation of acid phosphates, permits in a majority of cases, of a fair estimate of the free hydrochloric to the phloroglucinvanillin drops end point and of the total available hydrochloric acid to the phenolphthalein end point; and the range from drops to alizarin and alizarin to phenolphthalein usually bear a certain relationship to nitrogenous products present in solution.

8. The period from alizarin to phenolphthalein after correcting for phosphates is normally about one-fifth of the total nitrogen, but shows wide variation in certain pathological cases.

9. The influence of the phosphates either present in the test meal or secreted by the cells of the stomach may be estimated by a process referred to in a previous publication.

10. The tryptophan reaction supposed to indicate cancer of the stomach has not been found to give uniform or conclusive results.

In conclusion it must be said that no individual characteristics in the chemical analysis of stomach contents can be looked upon as having any absolute diagnostic value. Only the intelligent combination of the various analyses with the microscopical examination taken in conjunction with the clinical side of the case can be looked upon as in any sense conclusive. On the other hand, something may be gained by the application of work of this nature to the solution of problems associated with the secretion of acids, etc., in the stomach and the suspension of this function under pathological conditions. It is excessively difficult to prove the existence of any specific toxic bodies in tumors, although from work on blood corpuscles recently carried out it appears probable that such conditions actually exist. In any case the great proportion of the toxic effects observed in cancer cachexia may be attributed to the influence of sub-oxidized products produced under the abnormal conditions of metabolism of the cell. The failure to secrete hydrochloric acid might well be due to some slight interference with the equilibrium of the chlorides, phosphates, carbonates, etc., in the blood serum. A slight increase in the viscosity of the cell membranes, increased difficulty in diffusion of chlorine ions in one direction and carbonate ions and others resulting from the oxidation processes in the opposite direction, might well result in such a disturbance of equilibrium as to lead to the suspension of such a sensitive function as the hydrochloric acid secretion. The observed increase of chlorides in the blood, decrease of alkalinity and increase in osmotic pressure, etc., associated with decreased secretion of certain salts in the urine all point in the same direction, but even when it is established that such conditions actually exist in cancer, it is extremely difficult to differentiate between cause and effect. It is for clinicians, aided by pathologists, and to a certain extent by chemists, to differentiate sharply between that which is cause and that which is effect in phenomena of this nature. Either by interference with the physico-chemical equilibrium of the cell a stimulus to proliferation might be induced or the agent producing the stimulation may at the same time play an important role in the production of the phenomenon referred to above, which might consequently be looked upon as a mere secondary reaction. This is a point upon which it is not possible to throw any considerable light at present.

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On the Reduction of Starch Iodide Solutions by Means of the Aqueous Extracts of Tissues.

By G. H. A. Clowes, Ph. D.

In a recent publication on chemical methods of differentiating hypernephromata from other tumors of the kidney, the statement is made by Croftan that the reduction of a starch iodide solution may be looked upon as characteristic of the extracts of the adrenals and also of hypernephromata, tumors supposedly derived from adrenal tissue. We are not able to confirm this observation of Croftan's. And further, bearing in mind the known decolorizing effect of ammonia and all alkaline solutions, lecithin and unsaturated fatty acids and even the proteids themselves on iodine solutions, it seemed extremely improbable that such a method as that suggested could have any differential value. It appeared to us necessary to submit the method suggested to a series of severe analytical tests before accepting it as a standard.

Croftan makes no exact statements regarding the strength of the iodine solution which he employed. He merely points out that too great a concentration should be avoided in order that a reaction may be obtained. We therefore carried out a series of experiments in which a n/500 solution of iodine and an equally strong solution of sodium-thio-sulphate were employed as standard solutions and a one per cent starch solution as indicator.

The blood serum, blood corpuscles, urine and various organs of a series of animals, as well as post-mortem material from human beings, were tested quantitatively regarding their reducing power. Our procedure was as follows: a given weight of certain tissue was ground in a mortar with a small quantity of sand and distilled water, repeated extracts being made in this manner until the total volume of fluid after filtration was equal to 100c.c. One c.c. of the starch solution was then added to each of three twenty-five c.c. portions; one was titrated directly by means of the dilute iodine solution; a second was first boiled and then titrated; to a third five c.c. of a n/50 sulphuric acid solution were added before titration. In dealing with the majority of extracts it was observed that no very sharp end point was obtainable, but comparable end points might be found in all cases; that is to say, the first end point was that point at which the iodine was no longer completely decolorized, leaving a faint pinkish-blue tinge through the solution for the space of a few seconds. On titrating further an end point was obtained where a distinct blue remained constant for a space of fully a minute. The solution was usually still capable of effecting a further decolorization of two or three c.c. of iodine solution, provided sufficient time was allowed to elapse, but we found that it was most satisfactory for general purposes to employ the second end point indicated above, at which the blue remained constant for about a minute.

The first materials treated in this manner were derived from a case of cancer of the stomach, in which the patient died as the result of a rupture of the stomach wall and in which it was possible to perform an autopsy within three hours after death. The following table represents the reducing power of the extracts of a series of organs, estimated in cubic centimeters of a n/500 iodine solution for each gram of tissue extracted. The first column represents results obtained on direct titration with iodine in the presence of starch in the cold; the second after treatment with a sufficient amount of dilute acid to render the solution acid to all indicators, and the third after boiling sufficiently to coagulate proteids.

It is interesting to note that using material from different portions of the tumor, of the adrenals and of the spleen, in the first case employing a strong and in the second a weak extract, very nearly the same results were obtained, showing that such a method may have considerable value from a quantitative standpoint. An investigation of the figures shows that nervous tissue obtained from

TABLE XIX.*

ORGAN EXTRACTED.		Cold solution.	Acid solution.	Boiled solution.
Nervous tissue		10.0	3.0 to 4.0 (blue)	
Liver		8.8 to 9.0	4.1	7.3 to 7.7
Pancreas		8.0	6.0	
First adrenal		8.0		
Second adrenal		7.8	6.8	
First tumor gland		7.6	7.6	7.6 to 8.0
Second tumor gland		7.5	7.5	
Spleen	a	7.5	5.0	4.2
	b	7.1 to 7.5		
Lung		5.5 to 6.4		
Kidney		5.0		
Omentum		3.0	2.3	
Fat from omentum (alone)		3.0 to 3.5		
Blood serum from heart		1.5		
Pleural fluid		1.1		
Peritoneal fluid		1.05		

the spinal column has the greatest reducing power in the cold, being slightly higher than that of the tumor, adrenal, spleen, liver and pancreas, all of which are comparatively speaking close to one another. The lungs and kidneys come next, followed by the omentum and other fatty materials which show the smallest reduction of all, indicating clearly that the action in question cannot be attributed to any great extent to the interference of fatty acids. An examination of the figures in the second column shows that after treating with acid, whereby all effects attributable to alkaline solutions and to bodies precipitated by dilute acids are eliminated, the tumor material still produces about the same effect, slightly greater than that of the adrenals, whilst all other organs undergo considerable diminution in reducing power, more especially the extract of nervous tissue, which has fallen to less than one-half of its original strength. The effect of boiling is to produce marked diminution in those cases in which a considerable precipitate is produced.

It must be remembered that the material employed in this series of experiments was obtained at an autopsy, consequently, although not more than a few hours elapsed from the death of the patient to the completion of the experiments, certain post-mortem chemical changes might have intervened sufficient to produce a considerable variation in the reducing power of the individual tissues.

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* These quantities represent the volume in cubic centimeters of a n/500 iodine solution capable of being reduced by the extract of one gram of each of the tissues or sera enumerated in the first column.

The next series recorded in Table XX refers to results obtained on treating the extracts of the organs of normal animals with dilute iodine in the presence of starch.

Table XX.

ORGAN EXTRACTED.	Cold solution.	Acid solution.	Boiled solution.
Normal guinea-pig:			
Brains	5.8	5.3	5.7
Liver	13.0	12.0	12.0
Adrenals	15.0	14.5	14.5
Kidneys	14.6	14.2	14.3
Blood	1.5	1.5	....
Normal rabbit:			
Kidneys	10.3	10.0	*8.0
Adrenals	9.5	9.0	9.4
Liver	8.7	8.0	*5.1
Lung	5.0	4.7	5.5
Fat	1.0	1.0	1.0
Blood	1.4	1.4	....

It may be observed that the results in this series do not differ very materially from those obtained in the human autopsy case referred to above. The point most worthy of notice is the reducing power of the adrenal extracts which in both cases lies very close to that of the kidneys and liver; in the case of the guinea-pig slightly higher, in that of the rabbit slightly lower than that of the kidneys. In both cases the kidneys, adrenals and liver head the list with a comparatively high reducing power, whilst the blood serum and fatty tissue both show an extremely low reduction, from one-seventh to one-tenth of that shown by the kidneys. Such results afford further proof that any differentiation of adrenal tissue or tissue supposedly derived from the adrenals by means of the starch iodine reaction is, from a quantitative standpoint, entirely out of the question.

We further made extracts of a tumor of the stomach and of the neighboring pepsin secreting cells in order to observe whether there

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* Heavy precipitate on boiling.

was any material difference in reducing power, but none was observed, as will be seen from the figures 2.2 and 2.4 given by different portions of the tumor and 2.2 and 2.3 by unaffected portions of the stomach wall. The table referring to this case and subsequent cases is omitted owing to lack of space, but it may be briefly stated that provided exactly identical conditions are maintained through any series of experiments, no differentiation by this means is, so far as we have at present been able to observe, capable of practical application. The reduction of iodine by means of solutions which have been treated previously with an excess of weak acid is slightly less than that of the original solutions, whilst energetic boiling resulting in a precipitation of proteids frequently results in a very material reduction of the reducing power. Fatty materials cause very small reduction. This is also the case with blood serum. Only in two cases was a result as high as 2.5 to 3 c.c. n/500 iodine solution by means of 1 c.c. of serum recorded; in one case the blood of a normal individual having an exceptionally high specific gravity and nitrogen content and in the second that of a case of cancer of the breast with metastases. The usual result was in the neighborhood of 1.4 to 1.6.

Blood corpuscles and leucocytes in the form of a clot produced a reduction ranging from 2 c.c. to 3 c.c. and it is proposed when time permits to make a series of determinations on the blood as a whole, of a series of cases, especially those in which a good iodinophilia is obtained with leucocytes. In all these cases treatment with acid invariably reduced the results, but never to an extent of more than fifteen or twenty per cent.

Examination of urine. The figures obtained in this series of experiments vary widely, from two to fourteen c.c. of iodine being required per c.c. of urine, but it is to be observed that perfectly constant results were obtained from the same specimen of urine, whilst that of the same individual might vary considerably from day to day. The highest results recorded were obtained in a case of advanced diabetes from urine containing six per cent of sugar. On the other hand, a urine obtained from a second diabetic case in which the sugar content was also above five per cent, showed results very little in excess of the normal. In a series of cases in which an impaired metabolism might have been expected to result in the secretion of an excess of bodies capable of producing this reduction of iodine in urine, this test was carried out, but it is not possible to distinguish such cases from the normal, and it will be necessary to carry out a good deal more work in this direction before recording any noteworthy results. The effect of adding an excess of acid to urines previously slightly alkaline was not found to be as great as might have been anticipated.

We also tried the effect of adding an excess of iodine solution to any given material the reducing power of which was to be determined, allowing the mixture to stand for a couple of minutes, titrating back the excess iodine with a sodium-thio-sulphate solution of equal strength and adding starch just before the end point was reached. Such a method was also capable of giving duplicate results on the same material provided sufficient care was exercised, but considerable variations between the results obtained by this method and those obtained by the direct method were frequently observed.

Examination of tumors of the kidney. A couple of cases of hypernephrom which had been preserved in formalin were submitted to examination following the directions given by Croftan and at the same time a sarcoma similarly treated and kidney tissue were submitted to an identical treatment. In no case was a reduction obtained equal to that of normal tissue, and the fact must not be overlooked that formalin itself if not removed is capable of exerting a reducing action upon iodine starch solution.

Summary. 1. It is possible, employing a n/500 iodine solution and a freshly prepared starch solution, to titrate the extracts of a large variety of normal tissues provided the greatest precautions are maintained regarding the uniformity of working conditions. The time factor and the stage at which the end point is recognized are most important and should be determined independently by each individual employing the method, such a method having merely a comparative but no absolute value.

2. The reducing power of an aqueous extract obtained from the adrenals is possessed of a strength averaging about the same as that

obtained from the kidneys and liver, the proportions being such that it appears impossible to differentiate between the adrenals and tumors derived from the adrenals and the other organs of the body by Croftan's method.

3. Blood serum, urine, etc., exert a reducing effect upon the solution in question, and it is proposed to accumulate data bearing upon this question with a view to observing whether such a reaction has any value as a means of diagnosing certain pathological conditions.

September, 1903.

Croftan. Virchow's Archiv. Vol. 169.

A Note on the Influence Exerted by X-Rays on the Metabolism of Normal Animals

By G. H. A. Clowes, Ph. D., and W. W. Plummer, M. D.

As a preliminary step to the investigation of the influence exerted by X-rays on the metabolism of cancer animals, a series of experiments was carried out on normal animals as follows: Eight guinea-pigs of the same origin and weighing 350 grams apiece were isolated in large funnels provided with a wire gauze base so as to facilitate the collection of urine and fæces. Four of them were exposed to the action of the X-rays, two for forty minutes and the remaining two for twenty minutes every second day for a period of thirty days, the four remaining animals being kept as a check on the experimental animals. The pigs were stretched on their backs on a board in such a manner that the abdomen was exposed to the direct force of the rays at a distance of eight inches from the poles, a current of 4 amperes and 110 volts being employed. For the first eight exposures merely a small portion of the hair of the abdomen was removed, but for the last five experiments the skin was shaved clean. All eight pigs received the same uniform diet of carrots, with occasional addition of greens. They were weighed at the same time daily and determinations made of the nitrogen of the urine and fæces and of the phosphoric acid, chlorides, indican, etc., of the urine. Blood counts were made from time to time, both before and after the exposures. At the end of the month the pigs were killed and their blood subjected to chemical analysis and tissues to pathological examination. The curves representing the increase in body weight show practically no deviations under the influence of the periods of X-ray treatment. At the end of the thirty days the four normal pigs showed an average increase of 40 per cent, the X-ray pigs an increase of 39 per cent of their original body weight. A scarcely greater difference was to be observed in the nitrogen loss in the urine and fæces, the normal pigs showing an average daily loss per kilo of body weight, amounting to 411 millegrams, whilst that of the X-ray pigs amounted to 394 millegrams. It is interesting to note that this figure is practically double that of the normal human being. The excretion of phosphates and indican followed the same lines as that of nitrogen, being slightly lower in the X-ray pigs than in the normal, which would scarcely be the case had the action of the X-rays on these animals been associated with a destruction of tissue. Blood counts showed fairly uniformly from four to five million reds, but considerable variations in leucocytes before and after exposure to the rays. The following table, based on the average of several determinations, shows in five cases out of six a considerable diminution in the number of leucocytes shortly after the completion of an experiment. The precaution was taken of regulating the diet of the animals in such a manner that the variations can not be attributed to that source. The chemical analyses of the blood gave practically identical results on the normal pigs and the X-ray pigs, the chlorine content averaging .3 to .35 per cent, the nitrogen 2.5 to 2.8 per cent, the only recognizable difference being a slightly greater degree of alkalinity of the serum of the X-ray pigs as compared with that of the normal.

TABLE.

Leucocyte count before and after exposure to X-rays.

Before.	After.
8,800	5,800
5,000	3,700
11,500	6,500
6,500	6,500 (?)
6,100	4,000
7,200	5,600

April, 1903.

A Note on the Quantitative Estimation of Phosphates in Stomach Contents

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By G. H. A. Clowes, Ph. D. (Published in the American Journal of Pharmacy, Vol. 75. July, 1903. No. 7.)

SUMMARY.

It has been shown that the usual method of roughly estimating the effect due to acid phosphates in the titration of stomach contents is incorrect; that one of the three acid affinities of phosphoric acid is saturated at the alizarin end point, and a second at the phenolphthalein end point. Consequently less than one-half of the total effect due to phosphates lies between the diazo (so called) and alizarin end points; while at least an equal effect is exerted on the portion usually looked upon as combined HCl.

A comparatively simple method has been suggested whereby a fairly accurate estimate of the phosphates present and the effect which they exert may be directly determined, dependent

(1) Upon the transition from NaH_2PO_4 to Na_2HPO_4 between the alizarin and phenolphthalein end points;

(2) The transition from Na_2HPO_4 to Na_3PO_4 between the phenolphthalein end point alone and in the presence of $BaCl_2$, whereby the alkaline Na_3PO_4 is converted into $Ba_3(PO_4)_2$ so soon as formed and thus removed from the scene of action.

The Relationship Between the Freezing Point Depression and Specific Gravity of Urine, Under the Varying Conditions of Metabolism, and its Clinical Value in the Estimation of Sugar and Albumin

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By G. H. A. Clowes, Ph. D. (Published in the American Journal of Physiology, Vol. 9. July 1, 1903. No. 5.)

Summary.

1. In normal urine the depression of the freezing point is directly proportional to the specific gravity, and may be determined from the latter by multiplying the figures after the decimal point by 75. (As an example, if the specific gravity is 1.022, $0.022 \times 75 = 1.65$, which is found by experiment to be the depression of the freezing point of such a solution in degrees C.) (See original article, Tables I and II.) This portion of the work is in agreement with the findings of Fuchs.

2. In pathological urines other than those containing sugar and albumin, the same tendency to maintain a constant proportion between the freezing point and specific gravity may be observed, although within rather wider limits than in the case of normal urines. (See original article, Tables III and IV.)

3. The average weight of the molecule or ion in urine may be determined from these figures as approximately 56 to 60, making use of Beckmann's formula,

$$M = E\,\frac{m}{\Delta}$$

where M = molecular weight of substance dissolved; E = a constant having the value of 18.5 when water is employed as the solvent;

m = the quantity of substance dissolved, assumed in this case to be 2.33 grams of substance for each 0.01 of specific gravity; and Δ = the observed depression of the freezing point (0.75° for each 0.01 of specific gravity).

4. In cancer, typhoid fever, and other diseases in which the excretion of chlorides is extremely small, the effect exerted upon the freezing point depression is not so great as might be expected from the removal of such a large proportion of the smaller ions. This tendency to maintain a constant state of equilibrium in the average size of the ions and molecules present in the urine may account for the high retention of the products of sub-oxidation and abnormal metabolism, known to exist in these cases. This view of the case may be advanced as a further argument in favor of the therapeutic administration of chlorides to patients on a milk diet, in order that molecular equilibrium of the urine may be maintained, and a more complete elimination of the products of metabolism effected.

5. In diabetic urines, the quantity of sugar may be very readily estimated by determining the lowering of the freezing point of the urine in question, and calculating the theoretical lowering of the freezing point from the specific gravity. The difference between these two quantities in degrees C., when multiplied by 6, gives a very close approximation of the actual percentage of sugar present in the solution. This factor, 6, calculated on a theoretical basis and subsequently confirmed in practice, is dependent on the fact that the molecular weight of sugar is 180, whilst the average of urine solids is below 60. (See original article, Tables VI, VII, VIII, IX, X, and XI.) These results are not all in accord with the observations made by Fuchs, who arrived at his factor, 10, by purely empirical means.

6. The quantity of albumin may be estimated by determining the specific gravity and freezing point in a urine to which a couple of drops of dilute acetic acid has been added, then boiling in order to precipitate the albumin, filtering and once more determining the specific gravity and freezing point. The second specific gravity is reduced to the same ionic concentration as the first, by multiplying its decimal portion by the freezing point before boiling, and dividing by the freezing point obtained after boiling. This calculated spe-

cific gravity is then subtracted from the original specific gravity determined before boiling, and the difference multiplied by the factor 400, which gives the percentage of albumin. (See original article, Table XII.)

7. In a urine containing both albumin and sugar, the former is first estimated by addition of acetic acid, as above, and the freezing point and specific gravity obtained after boiling are employed in the estimation of sugar.

The Metachromatism of Mast Cell Granules and Mucin.

By G. H. A. Clowes, Ph. D., and Alice G. Owen. (Published in the Journal of Medical Research. 1904.)

Summary.

The metachromatism exhibited by the granules of mast cells on staining with 10 per cent polychrome methylene blue may be considered as a simple acid-alkali reaction, the compound formed between the methylenazur of the stain and the granules being sufficiently sensitive to acids and alkalis to function as an indicator in the strict chemical sense of the word.

The granules exhibit a *blue coloration with acids* and a *red with alkalies.*

The tendency to change color on passing from acid to alkaline solutions is exhibited by other constituents in the tissue but to a considerably less marked degree.

Whilst the transition from blue to red with alkalies and from red to blue with acids may be observed whatever the nature of the hardening agent previously employed, it should be noted that formalin hardened material shows a far greater tendency to blue and alcohol and sublimate-hardened material to red, even though the original hardening solutions were perfectly neutral. The ability of formalin to combine with ammonia and amido derivatives may well account for this peculiarity.

Oxidizing and reducing agents produce no marked color changes from red to blue or vice versa when stained mast cells are submitted to their action. Reducing agents tend to decolorize the sections as might be anticipated.

The granules are insoluble in weak acids but readily soluble in weak alkalies. Their tendency to dissolve may, however, be ma-

terially affected by their preliminary treatment with various hardening agents and mineral salts.

The globules of mucin present in goblet cells of the intestinal mucosa stain faintly blue with dilute polychrome methylene blue and show a tendency to red on treatment with acids. On heavily overstaining with concentrated polychrome methylene blue and decolorizing with acetic acid the globules are stained red and on subsequent treatment with dilute alkalies are decolorized or rendered slightly blue. The red color may once more be restored by subsequent treatment with dilute acid, but is not so intense as in the original section. The globules in question are also considerably more soluble in alkalies than are the granules of mast cells.

The leucocytes on staining with polychrome methylene blue show much less polychromatic tendency than the mast cells, retaining both in acid and alkaline solutions a violet to blue color up to the point of decolorization.

Since mast cells take polychrome methylene blue much more readily than does mucin and exhibit a blue color with acids and a red with alkalies, whilst mucin is red with acids and decolorized with alkalies; also since the globules of mucin are far more soluble in alkaline solutions than are the mast-cell granules, it may be concluded that they differ very materially in chemical constitution.

Much is already known regarding the effect exerted on the staining properties of bodies of the type of thionin, methylene blue, etc., on introducing acids or basic groups at various points in the molecule; also regarding the effect of acids, alkalies and oxidizing and reducing agents on the compounds thus formed.

A thorough investigation of the nature of polychrome methylene blue from a purely chemical standpoint, following the lines adopted by Michaelis, would be extremely valuable. It should then be possible, making use of the various constituents of this stain under varying conditions of acidity and alkalinity, to obtain considerable information regarding the chemical nature of the granules and other secretory products present in mast cells, leucocytes, etc., and to compare them with bodies of known chemical composition.

This line of research is one which we propose to take up at the first available opportunity and as soon as the stains in question are procurable.

The Theory of Indicators and Its Bearing on the Analysis of Physiological Solutions by Means of Volumetric Methods.

By G. H. A. Clowes, Ph. D. (Published in the American Journal of Pharmacy. 1904.)

In this paper the physico-chemical theory of indicators was discussed in so far as its principles were found to be applicable to the solution of problems involved in the volumetric analysis of physiological solutions.

Practically all indicators are sensitive to strong acids and strong bases. They may, however, be divided into three distinct classes when tested with a series of weak acids and weak bases of the type present in physiological solutions. At one end of the scale are those which in view of an extremely weak acid affinity are particularly affected by weak acids and are, comparatively speaking, indifferent to weak bases, whilst at the other end of the scale are to be found those which are possessed of strong acid or weak basic combining groups which render them very susceptible to the influence of weak bases but more or less indifferent to that of weak acids.

It is further possible to differentiate between a series of two or more acids or bases present in the same solution, provided one can find indicators, the combining affinity of which to form neutral salts, lies intermediate between those of the bodies to be titrated. A good illustration of this mode of differentiation is the recognition of the three acid groups of phosphoric acid, the first one of which coincides with the first alizarin end point, the second with the second alizarin end point, or with the phenolphthalein end point, and the third with the phenolphthalein end point in the presence of barium chloride: or aspartic acid, for example, the first acid affinity of which is neutralized at the alizarin or phenolphthalein end point, the second only at the end point of Porrier's blue. Carbonic acid affords an interesting contrast to aspartic acid, neither of its acid groups being strong enough to affect alizarin, one only giving an indication with phenolphthalein and both with Porrier's blue. It will thus be seen that in their behavior towards phenolphthalein and alizarin we have a sharp differentiation between the strongest acid affinities of aspartic and carbonic acid respectively.

At the other end of the scale phloroglucinvanillin is sensitive to the amido group present in aspartic acid and entirely indifferent to the acid groups referred to above. Whilst Porrier's blue is absolutely indifferent to ammonia and all weak basic groups, alizarin is sensitive to ammonia but not to amido groups of the type present in glycocol, leucin and tyrosin. Phloroglucinvanillin as an indicator gives a sharp titration of NH_2 groups of this class and one of the NH_2 groups in asparagin. It is unaffected by the second or amido group of asparagin and those of the same type present in acetamid, formamid, urea, etc.

In discussing the effect of albumoses, peptones, etc., on indicators, it was shown that perfectly pure preparations of these substances show a wide range of variation in titration end points, attributable presumably to the influence of weak basic groups present in the molecule; further, that in advancing hydrolysis the range from the lowest to the highest end points was increased, and that this effect cannot be attributable to the influence of phosphates, organic acids and chlorides to the same extent as has been generally supposed.

The comparison of volumetric with gravimetric analyses of normal and pathological stomach contents showed that provided a plain Ewald, or by preference a purely proteid test meal were employed, and the materials examined in the space of three hours, with very few exceptions the phenolphthalein end point gives a fairly accurate estimate of the total available hydrochloric acid present in the stomach, either in a free state or combined more or less feebly with proteids. The influence exerted by phosphates is usually small and may be allowed for by making a separate estimation of the quantity present according to a method suggested by the writer in a previous paper.

The end point of phloroglucinvanillin drops used on a warm plate gives a fairly accurate estimate of the actual free hydrochloric acid. The range of titration from the phloroglucinvanillin end point to that of phenolphthalein, after allowing for the influence of phosphates and traces of organic acid may be said to be a function of the basic affinities of proteids and their decomposition products present in the solution. The total range and the end points of intermediate indicators are dependent upon the total quantity of such bodies present in the solution and the extent of their hydrolysis or decomposition, and provided comparable conditions of experiment are employed this range may be said to be fairly proportionate to the peptic activity of the mixture.

Under pathological conditions where hydrochloric acid is absent or diminished in quantity, and peptic digestion fails to take its normal course, especially where organic acids have been produced under the influence of bacteria, the above rules are no longer applicable. The total range no longer bears the slightest relationship to the titration results; chlorides determined gravimetrically are found to be far below the phenolphthalein end point; the nitrogen present in so-called phosphotungstic filtrate rises above the normal, which is from 20 to 25 per cent of the total nitrogen in a well-digested mixture. All these factors point to the abnormal breaking down of proteids beyond the point normally reached in peptic digestion in the stomach, presumably under the influence of bacterial enzymes functioning in a neutral solution with the liberation of additional weak basic and acid groups, as a result of the abnormal hydrolysis.

In tryptic digestion due allowance must be made for the influence of a known quantity of sodium carbonate which may be estimated independently. Both the acid groups of this body are capable of exerting an influence upon Porrier's blue, whilst only one affects phenolphthalein and other indicators such as alizarin or phloroglucinvanillin are entirely unaffected. After allowing for the influence due to carbonic acid it is found that the range of titration increases with increasing digestion, being at the early stages more or less proportionate to the amount of proteid brought into solution as estimated by the total nitrogen, but subsequently increasing in undue proportion to the total nitrogen as digestion proceeds, with the formation of simpler nitrogenous products.

The bearing which work of this nature may have on the solution of certain problems connected with the constitution of proteids and their decomposition products was also discussed. Titrations of normal blood serum showing a wide variation with different indicators which could not possibly be attributed to the inorganic constituents of the serum were tabulated and the necessity of an agreement upon certain specific indicator end points for serum titration emphasized.

The titration results on urine were shown to be fairly dependent on the amount of phosphates present, the small proportion of amido bases and weak acids present exerting a relatively small effect in normal cases. A normal urine should be acid to phenolphthalein and alkaline to alizarin, the end point lying somewhere between the neutralization points of these indicators. In other words, whilst the first acid group of the phosphates should be neutralized, the third acid group should remain free, varying proportions of the second group being neutralized or not according to the state of equilibrium of the system. Naturally in the presence of any considerable quantity of ammonia which in contradistinction to urea exerts a powerful effect upon alizarin and phenolphthalein, the urine would be less acid, or even alkaline to phenolphthalein and more strongly alkaline to alizarin than is normally the case.

FOOD AND DRUGS

REPORT

OF

WILLIS G. TUCKER, M. D. Ph. D.

Director Bureau of Chemistry, New York State Department of Health.

DANIEL LEWIS, M. D., *Commissioner New York State Department of Health, Albany, N. Y.:*

Sir—During the year ended December 31, 1903, 50 samples of water and three samples of sewage, from various parts of the state, and most of them received from local boards of health, have been analyzed and the results, as reported to the senders of the samples, may be found appended to this report. Sixty-nine samples of food articles, the collection of which was referred to in the last annual report, have been examined and are now reported upon in full, and various analyses of miscellaneous articles have been made as ordered from time to time and are herein stated. A summary of the work done during the year is as follows:

January 13. Received sample of water from Dr. L. A. Gould, health officer, Farmer. Ordered examined January 13. Analyzed and reported upon January 21.

January 27. Received sample of water from Dr. J. A. Reed, health officer, Newark. Ordered examined January 28. Analyzed and reported upon January 31.

January 30. Preliminary report made on examination of certain food articles as follows:

ALBANY, *January* 30, 1903

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany, N. Y.:*

Dear Sir—I beg respectfully to submit a preliminary report upon the examination of a part of the samples of food articles collected in August last by agents of the Department in different localities in the state, and would say that the remainder of the samples will shortly be reported upon, and that separate reports upon each of the samples, giving full particulars concerning it. will be transmitted when the blanks now being printed for this purpose are ready and when the examination of all the samples shall have been completed.

The following articles are now reported upon:

Lager beer, bottled, 2 samples (Nos. 10693 and 10694). Purchased in Utica and Little Falls. One of good quality and free from foreign bitter or preservative, and one sample contained salicylic acid, which is very often added to bottled beers, although such addition constitutes a violation of certain provisions of law.

Whiskey, 8 samples (Nos. 10695-10702). Purchased in Ogdensburg, Clayton, Carthage, Watertown, Utica, Herkimer and Little Falls. None of these met the pharmacopoeial requirement as to alcoholic strength and most of them yielded a large excess of total solids. Six of the samples, however, deserve to be rated as of fair quality, while two of them have been rated as inferior chiefly on account of deficiency in alcoholic strength. In one of these the total solids also are excessive. While neither of these samples shows any evidence of the presence of any *harmful* adulterant or injurious constituent they may fairly be considered as adulterated within the meaning of the law, for, if regarded as drugs, they do not comply with the pharmacopoeial requirements. and, if regarded as foods, their strength has been reduced or lowered. They are by no means, however, to be regarded as flagrant instances of adulteration.

Coffee, 11 samples (Nos. 10703-10713). Purchased in Sag Harbor, Greenport, Riverhead, Hempstead, Fine View, Remsen and Newport. One sample ground and others whole coffee. All unadulterated and genuine coffee of good quality.

Canned tomatoes, 5 samples (Nos. 10723-10727). Purchased in Sag Harbor, Greenport, Riverhead, Hempstead and Little Falls. None contained any coloring matter and all of good quality.

Mustard, powdered, 7 samples (Nos. 10737-10743). Purchased in Sag Harbor, Greenport, Riverhead, Hempstead, Ogdensburg and Carthage. Of these samples six were of good quality, containing neither added starch nor artificial coloring matter. One sample was adulterated with wheat flour and tumeric.

Cream of tartar, 7 samples (Nos. 10744-10750). Purchased in Sag Harbor, Greenport, Riverhead, Hempstead, Clayton, Plessis and Adams. Four of these were genuine and of excellent quality; one consisted chiefly of acid phosphate of lime and starch, and two consisted chiefly of sulphate of lime. Three of the seven were therefore fictitious.

Very respectfully yours

WILLIS G. TUCKER

Director

ALBANY, *February* 24, 1903

DR. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany, N. Y.:*

Dear Sir—I transmit herewith detailed reports on the examination of forty (40) samples of food articles concerning which a preliminary report was made on January 30. The samples consist of the following:

Lager beer, 2 samples.
Whiskey, 8 samples.
Coffee, 11 samples.
Canned tomatoes, 5 samples.
Powdered mustard, 7 samples, and
Cream of tartar, 7 samples.

It is recommended that warning notices in the usual style be sent to those dealers whose samples are reported as of inferior quality, or as found adulterated, and that no publicity be given to the names of the makers of the articles reported as of good quality or not adulterated, or to the brands or trade-names of any such articles, to the end that findings which may be simply negative be not used by the makers or sellers of the same as advertisements of these articles or guarantees of purity or excellence by the department.

Twenty-nine samples, consisting of cocoas and chocolates, tomato catsup and extract of vanilla remain to be reported upon, and it is expected that reports upon most of these will be transmitted before the end of the present month.

Very respectfully yours
WILLIS G. TUCKER
Director

No. 10693

September 2, 1902, received from State Department of Health a sample of lager beer, purchased by G. G. Champlin, August 29, 1902, from Joseph Hamburger, 116 Bleecker street, Utica; examined and found of good quality, containing neither foreign bitter nor preservative.

Bureau of chemistry, February 24, 1903.

No. 10694

September 2, 1902, received from State Department of Health a sample of lager beer, purchased by G. G. Champlin, August 30, 1902, from Anthony Gressler, 517 East Main street, Little Falls;

examined and found to contain no foreign bitter, but salicylic acid has been added as a preservative.

Bureau of chemistry, February 24, 1903.

No. 10695

September 2, 1902, received from State Department of Health a sample of whiskey, purchased by G. G. Champlin, August 11, 1902, from F. A. Brandy, 47 Isabella street, Ogdensburg; examined the same and find that it has a specific gravity at 15 degrees C. of 0.938; total residue from evaporation of 100 cubic centimeters, 0.6588 gram; fair quality.

Bureau of chemistry, February 24, 1903.

No. 10696

September 2, 1902, received from State Department of Health a sample of whiskey, purchased by G. G. Champlin, August 14, 1902, from L. H. Nims, Clayton; examined the same and find that it has a specific gravity at 15 degrees C. of 0.943; total residue from evaporation of 100 cubic centimeters, 0.4628 gram; fair quality.

Bureau of chemistry, February 24, 1903.

No. 10697

September 2, 1902, received from State Department of Health a sample of whiskey, purchased by G. G. Champlin, August 20, 1902, from E. A. Colligan, Carthage; examined the same and find that it has a specific gravity at 15 degrees C. of 0.942; total residue from evaporation of 100 cubic centimeters, 0.4408 gram; fair quality.

Bureau of chemistry, February 24, 1903.

No. 10698

September 2, 1902, received from State Department of Health a sample of whiskey, purchased by G. G. Champlin, August 21. 1902, from Empire Wine and Liquor Co., 31 Court street, Watertown; examined the same and find that it has a specific gravity at 15 degrees C. of 0.950; total residue from evaporation of 100 cubic centimeters, 0.4608 gram; the high specific gravity indicates an undue amount of water, so that this sample is rated as of inferior quality, although there is no evidence of harmful adulteration.

Bureau of chemistry, February 24, 1903.

No. 10699

September 2, 1902, received from State Department of Health a sample of whiskey, purchased by G. G. Champlin, August 28, 1902, from C. V. Schram, 111 Genesee street, Utica; examined the same and find that it has a specific gravity at 15 degrees C. of 0.943; total residue from evaporation of 100 cubic centimeters, 0.8464 gram; fair quality.

Bureau of chemistry, February 24, 1903.

No. 10700

September 2, 1902, received from State Department of Health a sample of whiskey, purchased by G. G. Champlin, August 29, 1902, from Casper Haller, Herkimer; examined the same and find that it has a specific gravity at 15 degrees C. of 0.953; total residue from evaporation of 100 cubic centimeters, 1.8332 grams; total residue unduly high and specific gravity high, indicating an undue amount of water; sample is rated as of inferior quality for these reasons, although there is no evidence of harmful adulteration.

Bureau of chemistry, February 24, 1903.

No. 10701

September 2, 1902, received from State Department of Health a sample of whiskey, purchased by G. G. Champlin, August 30, 1902, from M. D. Buckley, Little Falls; examined the same and find that it has a specific gravity at 15 degrees C. of 0.944; total residue from evaporation of 100 cubic centimeters, 0.1428 gram; fair quality.

Bureau of chemistry, February 24, 1903.

No. 10702

September 2, 1902, received from State Department of Health a sample of whiskey, purchased by G. G. Champlin, August 30, 1902, from Little Falls Wine Co., Little Falls; examined the same and find that it has a specific gravity at 15 degrees C. of 0.944; total residue from evaporation of 100 cubic centimeters, 0.2744 gram; fair quality.

Bureau of chemistry, February 24, 1903.

No. 10703

August 18, 1902, received from State Department of Health a sample of coffee, purchased by C. E. Thompson, from John Gibbons, Sag Harbor; examined the same and find that it is a ground coffee of good quality.

Bureau of chemistry, February 24, 1903.

No. 10704

August 18, 1902, received from State Department of Health a sample of coffee, purchased by C. E. Thompson, from John Gibbons, Sag Harbor; examined the same and find that it consists of genuine coffee beans of good quality.

Bureau of chemistry, February 24, 1903.

No. 10705

August 20, 1902, received from State Department of Health a sample of coffee, purchased by C. E. Thompson, from Charles B. Wiggins, Greenport; examined the same and find that it consists of genuine coffee beans of good quality.

Bureau of chemistry, February 24, 1903.

No. 10706

August 20, 1902, received from State Department of Health a sample of coffee, purchased by C. E. Thompson, from Charles B. Wiggins, Greenport; examined the same and find that it consists of genuine coffee beans of good quality.

Bureau of chemistry, February 24, 1903.

No. 10707

August 21, 1902, received from State Department of Health a sample of coffee, purchased by C. E. Thompson, from J. T. Hallock, Riverhead; examined the same and find that it consists of genuine coffee beans of good quality.

Bureau of chemistry, February 24, 1903.

No. 10708

August 21, 1902, received from State Department of Health a sample of coffee, purchased by C. E. Thompson, from J. T. Hallock, Riverhead; examined the same and find that it consists of genuine coffee beans of good quality.

Bureau of chemistry, February 24, 1903.

No. 10709

August 22, 1902, received from State Department of Health a sample of coffee, purchased by C. E. Thompson, from R. S. Powell, Hempstead; examined the same and find that it consists of genuine coffee beans of good quality.

Bureau of chemistry, February 24, 1903.

No. 10710

August 22, 1902, received from State Department of Health a sample of coffee, purchased by C. E. Thompson, from R. S. Powell, Hempstead; examined the same and find that it consists of genuine coffee beans of good quality.

Bureau of chemistry, February 24, 1903.

No. 10711

September 2, 1902, received from State Department of Health a sample of coffee, purchased by G. G. Champlin, August 26, 1902, from W. F. Newton, Fine View; examined the same and find that it consists of genuine coffee beans of good quality.

Bureau of chemistry, February 24, 1903.

No. 10712

September 2, 1902, received from State Department of Health a sample of coffee, purchased by G. G. Champlin, August 28, 1902, from O. B. Griffith, Remsen; examined the same and find that it consists of genuine coffee beans of fair quality.

Bureau of chemistry, February 24, 1903.

No. 10713

September 2, 1902. received from State Department of Health a sample of coffee, purchased by G. G. Champlin, August 28, 1902, from M. N. Pearce, Newport; examined the same and find that it consists of genuine coffee beans of fair quality.

Bureau of chemistry, February 24, 1903.

No. 10723

August 18, 1902, received from State Department of Health a sample of canned tomatoes, purchased by C. E. Thompson from John Gibbons, Sag Harbor; examined the same and it is not found adulterated.

Bureau of chemistry, February 24, 1903.

No. 10724

August 20, 1902. received from State Department of Health a sample of canned tomatoes, purchased by C. E. Thompson from Charles B. Wiggins, Greenport; examined the same and it is not found adulterated.

Bureau of chemistry, February 24, 1903.

No. 10725

August 21, 1902, received from State Department of Health a sample of canned tomatoes, purchased by C. E. Thompson from J. T. Hallock, Riverhead; examined the same and it is not found adulterated.

Bureau of chemistry, February 24, 1903.

No. 10726

August 22, 1902, received from State Department of Health a sample of canned tomatoes, purchased by C. E. Thompson from R. S. Powell, Hempstead; examined the same and it is not found adulterated.

Bureau of chemistry, February 24, 1903.

No. 10727

September 2, 1902, received from State Department of Health a sample of canned tomatoes, purchased by G. G. Champlin, August 30, 1902, from the New York Grocery, Little Falls; examined the same and it is not found adulterated.

Bureau of chemistry, February 24, 1903.

No. 10737

September 18, 1902, received from State Department of Health a sample of powdered mustard, purchased by C. E. Thompson from John Gibbons, Sag Harbor; examined the same and it is not found adulterated.

Bureau of chemistry, February 24, 1903.

No. 10738

August 18, 1902, received from State Department of Health a sample of powdered mustard, purchased by C. E. Thompson from John Gibbons, Sag Harbor; examined the same and it is not found adulterated.

Bureau of chemistry, February 24, 1903.

No. 10739

August 20, 1902, received from State Department of Health a sample of powdered mustard, purchased by C. E. Thompson from Charles B. Wiggins, Greenport; examined the same and it is not found adulterated.

Bureau of chemistry, February 24, 1903.

No. 10740

August 21, 1902, received from State Department of Health a sample of powdered mustard, purchased by C. E. Thompson from J. T. Hallock, Riverhead; examined the same and it is not found adulterated.

Bureau of chemistry, February 24, 1903.

No. 10741

August 22, 1902, received from State Department of Health a sample of powdered mustard, purchased by C. E. Thompson from R. S. Powell, Hempstead; examined the same and it is not found adulterated.

Bureau of chemistry, February 24, 1903.

No. 10742

September 2, 1902, received from State Department of Health a sample of powdered mustard, purchased by G. G. Champlin, August 11, 1902, from Frank Johnson, 82 Ford street, Ogdensburg; examined the same and find that it contains wheat flour and turmeric.

Bureau of chemistry, February 24, 1903.

No. 10743

September 2, 1902, received from State Department of Health a sample of powdered mustard, purchased by G. G. Champlin, August 20, 1902, from C. N. Schmid, Carthage; examined the same and it is not found adulterated.

Bureau of chemistry, February 24, 1903.

No. 10744

August 18, 1902, received from State Department of Health a sample of cream of tartar, purchased by C. E. Thompson from John Gibbons, Sag Harbor; examined the same and find that it is genuine cream of tartar, 99 per cent pure.

Bureau of chemistry, February 24, 1903.

No. 10745

August 20, 1902, received from State Department of Health a sample of cream of tartar, purchased by C. E. Thompson, from Charles B. Wiggins, Greenport; examined the same and find that it is genuine cream of tartar, 99.5 per cent pure.

Bureau of chemistry, February 24, 1903.

No. 10746

August 21, 1902, received from State Department of Health a sample of cream of tartar, purchased by C. E. Thompson from J. T. Hallock, Riverhead; examined the same and find that it contains acid calcium phosphate, tartaric acid and starch, with acidity equivalent to 79 per cent cream of tartar; fictitious.

Bureau of chemistry, February 24, 1903.

No. 10747

August 22, 1902, received from State Department of Health a sample of cream of tartar, purchased by C. E. Thompson from R. S. Powell, Hempstead; examined the same and find that it is genuine cream of tartar, 99.5 per cent pure.

Bureau of chemistry, Feruary 24, 1903.

No. 10748

September 2, 1902, received from State Department of Health a sample of cream of tartar, purchased by G. G. Champlin. August 14, 1902, from E. A. Burlingame, Clayton; examined the same and find that it is adulterated with calcium sulphate; acidity equivalent to 10 per cent cream of tartar.

Bureau of chemistry, February 24, 1903.

No. 10749

September 2, 1902, received from State Department of Health a sample of cream of tartar, purchased by G. G. Champlin. August 19, 1902, from Makepeace Bros., Plessis; examined the same and find that it is adulterated with calcium sulphate; acidity equivalent to 9 per cent cream of tartar.

Bureau of chemistry, February 24, 1903.

No. 10750

September 2, 1902, received from State Department of Health a sample of cream of tartar, purchased by G. G. Champlin, August 21, 1902, from J. O. Brown, Adams; examined the same and find that it is genuine cream of tartar, 99.5 per cent pure.

Bureau of chemistry, February 24, 1903.

Preliminary report made on examination of certain food articles as follows:

ALBANY, *February* 26, 1903

DR. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany, N. Y.:*

Dear Sir—I beg to transmit a second report upon the examination of a further part of the samples of food articles collected in August last by agents of the department in different localities. The remaining samples, eleven in number, will shortly be reported upon, and separate detailed reports upon each of these samples will also be transmitted.

The articles now reported upon are as follows:

Tomato catsup, 9 samples (Nos. 10714-10722). Purchased in Sag Harbor, Greenport, Riverhead, Hempstead, Remsen and Newport. Only one of these samples was found free from artificial coloring matter and preservatives and rated as not adulterated. Four of the samples contained benzoic acid, probably generally added in the form of benzoate of sodium, and a coal-tar color; two contained salicylic acid without artificial color, and two contained salicylic acid and a coal-tar color. These results agree with those obtained elsewhere excepting that the proportion of samples containing salicylic acid is larger than commonly found of late, this preservative having during recent years been largely replaced by benzoic acid in some form; but as the number of samples examined was small no conclusion as to the relative frequency of employment of these agents should be drawn from the results. In 1897 the Connecticut Agricultural Experiment Station found that in 41 brands of catsup examined only 6 were free from chemical preservatives. Of the remaining 35 brands 27 contained salicylic acid and 8 benzoic acid. In 1901 there were examined at this station 106 samples of catsup, chili sauce, etc., of which 18 contained salicylic acid, 67 benzoic acid, and in 21 no preservative was found. Of these 106 samples 86, or 81 per cent, contained some coal-tar color. Examinations elsewhere made indicate that similar conditions exist pretty generally and that the use of chemical preservatives and artificial colors in catsups and sauces is very common.

Extract of vanilla, 9 samples (Nos. 10728-10736). Purchased in Sag Harbor, Greenport, Hempstead, Alexandria Bay and Cape Vincent. These nine samples included but eight brands, of which but one brand (two samples) was deemed a genuine extract made from real vanilla or the so-called vanilla bean. So far as this article is concerned we have really no standard by which to judge it in this state and it is probably time that a standard should be established by the department as provided in the Public Health Law. The United States Pharmacopoeia includes a tincture to be made from true vanilla by percolation with alcohol and water containing sugar but no other foreign matter, and if this article is sold as a drug it should comply with the pharmacopoeial requirements and be made by the prescribed method. But when "vanilla" is sold for domestic use as a flavoring extract I do not think that it need necessarily comply with the pharmacopoeial standard. Most of the extract now upon the market is artificially compounded from synthetic vanillin, which is identical with the most important constituent of real vanilla, and synthetic coumarin, which is the flavoring constituent of the tonka bean. These substances are dissolved in weak alcohol, and sugar or saccharin, glycerin, some coloring matter, generally caramel, and other substances added. In some instances the real vanilla bean is used in part, and tonka or coumarin and other substances combined with it, so that there is a wide diversity in the quality and also in the strength of the extracts sold in the stores and of course a corresponding diversity in their value as flavoring extracts. Since coumarin is not a constituent of genuine vanilla, but is added to heighten the flavor and increase the apparent strength, it may be held that any extract containing it is a compounded, artificial or adulterated article, and such preparations, unless labeled "compound," are so regarded by some analysts and classed by them as adulterated.

As above stated two samples only, or one brand, of the nine samples examined are entitled to be rated as genuine extracts. The other samples all contained coumarin, which can not be present in an extract made from real vanilla exclusively, together with vanillin. The samples contained from 0.0464 to 0.1704 gram of vanillin, and from 0.0800 to 0.2008 gram of coumarin in 100 cubic centimeters, these figures approximately representing percentages, since the specific gravity of these extracts does not differ much from that of water. These eight samples have therefore been rated as artificial, although genuine vanilla may have been used in the preparation of some of them.

None of them contain any harmful constituent; they are serviceable as flavoring extracts, and the samples labeled "compound" can hardly be considered as deceptive. In my opinion it is inadvisable to interfere with the sale of such articles until a standard shall have been set by the department to which it shall be required that such extracts shall conform.

Very respectfully yours
WILLIS G. TUCKER
Director

March 2. Sample of water received from W. J. Roser, president board of health, Canajoharie. Ordered examined same day. Analyzed and reported upon March 6.

March 4. Detailed reports upon examination of certain foods transmitted as follows:

ALBANY, *March* 4, 1903

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany:*

Dear Sir—I transmit herewith detailed reports on the examination of eighteen samples of food articles concerning which a preliminary report was made on February 26. The samples consist of the following:

Tomato catsup, 9 samples.
Extract of vanilla, 9 samples.

I am of opinion that until such time as standards are established and proper notice given concerning the use of coloring agents and preservatives, and the manufacture of extract of vanilla, that no warning notices should be sent to the dealers from whom these samples were purchased. The results of these analyses should be published in our report, but no publicity should be given to the names of the makers of the articles reported as not adulterated, nor to the brands or trade-names of any such articles, to the end that findings which may be purely negative be not used by the makers or sellers of the same as advertisements of these articles or guarantees of purity or of excellence of the same.

Eleven samples, consisting of cocoas and chocolates, remain to be reported upon and it is expected that reports upon these samples will be ready to be transmitted within a few days. This will complete the examination of the samples of food articles collected in August last.

Very respectfully yours
WILLIS G. TUCKER
Director

No. 10714

August 18, 1902, received from State Department of Health a sample of tomato catsup, purchased by C. E. Thompson, from John Gibbons, Sag Harbor; examined the same and find that it contains benzoic acid and a coal-tar color.

Bureau of chemistry, March 4, 1903.

No. 10715

August 18, 1902, received from State Department of Health a sample of tomato catsup, purchased by C. E. Thompson, from John Gibbons, Sag Harbor; examined the same and find that it contains benzoic acid and a coal-tar color.

Bureau of chemistry, March 4, 1903.

No. 10716

August 20, 1902, received from State Department of Health a sample of tomato catsup, purchased by C. E. Thompson, from Charles B. Wiggins, Greenport; examined the same and find that it contains benzoic acid and a coal-tar color.

Bureau of chemistry, March 4, 1903.

No. 10717

August 20, 1902, received from State Department of Health a sample of tomato catsup, purchased by C. E. Thompson, from Charles B. Wiggins, Greenport; examined the same and it is not found adulterated.

Bureau of chemistry, March 4, 1903.

No. 10718

August 21, 1902, received from State Department of Health a sample of tomato catsup, purchased by C. E. Thompson, from J. T. Hallock, Riverhead; examined the same and find that it contains salicylic acid.

Bureau of chemistry, March 4, 1903.

No. 10719

August 21, 1902, received from State Department of Health a sample of tomato catsup, purchased by C. E. Thompson, from J. T. Hallock, Riverhead; examined the same and find that it contains salicylic acid and a coal-tar color.

Bureau of chemistry, March 4, 1903.

No. 10720

August 22, 1902, received from State Department of Health a sample of tomato catsup, purchased by C. E. Thompson, from R. S. Powell, Hempstead; examined the same and find that it contains salicylic acid.

Bureau of chemistry, March 4, 1903.

No. 10721

September 2, 1902, received from State Department of Health a sample of tomato catsup, purchased by G. G. Champlin, August 28, 1902, from O. R. Griffith, Remsen; examined the same and find that it contains benzoic acid and coal-tar color.

Bureau of chemistry, March 4, 1903.

No. 10722

September 2, 1902, received from State Department of Health a sample of tomato catsup, purchased by G. G. Champlin, August 28, 1902, from M. N. Pearce, Newport; examined the same and find that it contains salicylic acid and a coal-tar color.

Bureau of chemistry, March 4, 1903.

No. 10728

August 18, 1902, received from State Department of Health a sample of extract of vanilla, purchased by C. E. Thompson, from John Gibbons, Sag Harbor; examined the same and find that it contains of venillin 0.0744 gram in 100 cubic centimeters; coumarin, none; not found adulterated.

Bureau of chemistry, March 4, 1903.

No. 10729

August 18, 1902, received from State Department of Health a sample of extract of vanilla, purchased by C. E. Thompson, from John Gibbons, Sag Harbor; examined the same and find that it contains of vanillin 0.1488 gram and of coumarin 0.0936 gram in 100 cubic centimeters; artificial.

Bureau of chemistry, March 4, 1903.

No. 10730

August 20, 1902, received from State Department of Health a sample of extract of vanilla, purchased by C. E. Thompson, from Charles B. Wiggins, Greenport; examined the same and find that it contains of vanillin 0.0784 grain in 100 cubic centimeters; coumarin, none; not found adulterated.

Bureau of chemistry, March 4, 1903.

No. 10731

August 20, 1902, received from State Department of Health a sample of extract of vanilla, purchased by C. E. Thompson, from Charles B. Wiggins, Greenport; examined the same and find that it contains of vanillin 0.0488 and of coumarin 0.1096 gram in 100 cubic centimeters; artificial; marked "Compound."

Bureau of chemistry, March 4, 1903.

No. 10732

August 21, 1902, received from State Department of Health a sample of extract of vanilla, purchased by C. E. Thompson, from J. T. Hallock, Riverhead; examined the same and find that it contains of vanillin 0.0464 and of coumarin 0.0936 gram in 100 cubic centimeters; artificial.

Bureau of chemistry, March 4, 1903.

No. 10733

August 22, 1902, received from State Department of Health a sample of extract of vanilla, purchased by C. E. Thompson, from R. S. Powell, Hempstead; examined the same and find that it contains of vanillin 0.0608 and of coumarin 0.0840 gram in 100 cubic centimeters; artificial.

Bureau of chemistry, March 4, 1903.

No. 10734

August 22, 1902, received from State Department of Health a sample of extract of vanilla, purchased by C. E. Thompson, from R. S. Powell, Hempstead; examined the same and find that it contains of vanillin 0.1180 and of coumarin 0.0780 gram in 100 cubic centimeters; artificial, but may be made in part from the bean as claimed; labeled "Vanilla Compound."

Bureau of chemistry, March 4, 1903.

No. 10735

September 2, 1902, received from State Department of Health a sample of extract of vanilla, purchased by G. G. Champlin, August 19, 1902, from Willard Davis, Alexandria Bay, N. Y.; examined the same and find that it contains of vanillin 0.1704 and of coumarin 0.2008 gram in 100 cubic centimeters; artificial.

Bureau of chemistry, March 4, 1903.

No. 10736

September 2, 1902, received from State Department of Health a sample of extract of vanilla, purchased by G. G. Champlin. August 22, 1902, from J. C. Gregor, Cape Vincent; examined the same and find that it contains of vanillin 0.1432 and coumarin 0.0800 gram in 100 cubic centimeters; artificial.

Bureau of chemistry, March 4, 1903.

March 19. Detailed reports upon the examination of certain food articles made as follows:

ALBANY. *March* 19, 1903

DR. DANIEL LEWIS, *Commissioner New York State Department of Health. Albany, N. Y.:*

Dear Sir—I respectfully enclose herewith reports on the examination of 11 samples of chocolates and cocoas, being the last of the samples of food articles collected by agents of the department in different parts of the state in August last, 58 of which have already been reported upon. The samples are numbered from 10751–10761, inclusive, 6 of them being designated chocolates and 5 called cocoas. The commercial articles sold as chocolate, cocoa or broma are all prepared from the cocoa bean, being the seed of *Theobroma cacae.* This contains normally 50 per cent or more of fat, together with starch, proteids, mineral matter and the alkaloids theobromine and caffeine. When extracted the fat is known as cocoa butter. It is largely used in pharmacy, and in the preparation of cocoas and chocolates. Part of the fat is often removed so that the article may be more easily reduced to a powder and preserved as such, or the same result is attained by adding sugar, starch, flour or other diluent. The fact of such removal is very frequently plainly stated upon the package and is not to be considered as in itself an evidence of adulteration, and particularly in the absence of any established standard. The distinction between chocolate and cocoa is generally based upon the presence of sugar and such flavoring as vanilla in the former, the latter being generally unsweetened and ordinarily sold in the form of powder instead of in cakes. Both chocolates and cocoas are also frequently compounded with other foods or food products, as malt extracts, milk, etc., and they are sometimes adulterated by the addition of ground cocoa shells and other inert and valueless matter, or by the addition of excessive quantities of starch, flour, sugar or other diluents. As a rule these articles are fairly well described on the labels, or printed matter accompanying the package in which they are contained, and in the absence of established standards of strength and quality they can not be called adulterated if unaccompanied by incorrect or misleading statements as to composition and if free from objectionable diluents or adulterants. The samples examined were as follows:

Chocolate, 6 samples (Nos. 10751–10756). Purchased in Sag Harbor, Greenport, Riverhead and Hempstead. In percentage of fat these varied from 12.24 to 57.93, and in ash from 1.03 to 6.07 per cent. None of them contained any objectionable adulterant. The sample containing the smallest percentage of fat was described as a "cream chocolate" and does not purport to be a pure chocolate.

Cocoa, 5 samples (Nos. 10757–10761). Purchased in Sag Harbor, Greenport, Riverhead, Hempstead and Cape Vincent. These varied in fat from 27.57 to 38.54 per cent and in ash from 3.62 to 8.30 per cent. In three instances it was expressly stated on the labels that part of the fat had been removed and one of the samples is described as made from cocoa beans, pasteurized milk, sugar and flavor. No objectionable adulterant was found in any case and all are deemed of satisfactory quality.

Very respectfully yours
WILLIS G. TUCKER
Director

No. 10751

August 18, 1902, received from State Department of Health a sample of Roberts' cream chocolate, purchased by C. E. Thompson from John Gibbons, Sag Harbor; examined the same and find that it yields of water 2.01 per cent, ash 6.07 per cent, and fat 12.24 per cent; called a "cream chocolate" and stated to be made from cream, sugar and cocoa; ash high and fat very low, but not sold as a pure chocolate and contains no objectionable adulterant.

Bureau of chemistry, March 19, 1903.

No. 10752

August 20, 1902, received from State Department of Health a sample of German sweet chocolate, purchased by C. E. Thompson from Charles B. Wiggins, Greenport; examined the same and find that it yields of water 0.98, ash 3.03, and fat 26.62 per cent; about half of fat removed; sold as a sweet chocolate; no objectionable adulterant.

Bureau of chemistry, March 19, 1903.

No. 10753

August 20, 1902, received from State Department of Health a sample of vanilla sweet chocolate, purchased by C. E. Thompson from Charles B. Wiggins, Greenport; examined the same and find that it yields of water 0.98, ash 1.03, and fat 25.65 per cent; about half of fat removed; sold as a sweet chocolate; no objectionable adulterant.

Bureau of chemistry, March 19, 1903.

No. 10754

August 21, 1902, received from State Department of Health a sample of chocolate, purchased by C. E. Thompson from J. T. Hallock, Riverhead; examined the same and find that it yields of water 2.59, ash 2.85 and fat 56.56 per cent; not adulterated.

Bureau of chemistry, March 19, 1903.

No. 10755

August 22, 1902, received from State Department of Health a sample of chocolate, purchased by C. E. Thompson from R. S. Powell, Hempstead; examined the same and find that it yields of water 2.81, ash 2.84 and fat 57.93 per cent; not adulterated.

Bureau of chemistry, March 19, 1903.

No. 10756

August 22, 1902, received from State Department of Health a sample of German sweet chocolate, purchased by C. E. Thompson from R. S. Powell, Hempstead; examined the same and find that it yields of water 0.81, ash 2.51, and fat 28.17 per cent; about half of fat removed, but sold as a sweet chocolate; no objectionable adulterant.

Bureau of chemistry, March 19, 1903.

No. 10757

August 18, 1902, received from State Department of Health a sample of cocoa, purchased by C. E. Thompson from John Gibbons, Sag Harbor; examined the same and find that it yields of water 5.42, ash 8.30, and fat 31.39 per cent; ash high and fat low, but sold as a "soluble cocoa," with statement that "proportion of natural fat is properly adjusted"; no objectionable adulterant.

Bureau of chemistry, March 19, 1903.

No. 10758

August 20, 1902, received from State Department of Health a sample of cocoa, purchased by C. E. Thompson from Charles B. Wiggins, Greenport; examined the same and find that it yields of water 4.45, ash 4.31 and fat 38.54 per cent; part of fat removed; no objectionable adulterant.

Bureau of chemistry, March 19, 1903.

No. 10759

August 21, 1902, received from State Department of Health a sample of cocoa, purchased by C. E. Thompson, from J. T. Hallock, Riverhead; examined the same and find that it yields of water 2.49, ash 3.62, and fat 27.57 per cent; stated to be made of cocoa beans, pasteurized milk, sugar and flavor; nearly half of fat removed; no objectionable adulterant.

Bureau of chemistry, March 19, 1903.

No. 10760

August 22, 1902, received from State Department of Health a sample of cocoa, purchased by C. E. Thompson, from R. S. Powell, Hempstead; examined the same and find that it yields of water 4.85, ash 5.18, and fat 31.85 per cent; fat low, but statement on package that "superfluous cocoa butter has been extracted"; no objectionable adulterant.

Bureau of chemistry, March 19, 1903.

No. 10761

September 2, 1902, received from State Department of Health a sample of cocoa, purchased by G. G. Champlin, August 22, 1902, from M. S. Cornair, Cape Vincent; examined the same and find that it yields of water 4.72, ash 4.09, and fat 37.29 per cent; fat low, but designated on package as a "pure cocoa from which excess of oil has been taken"; no objectionable adulterant.

Bureau of chemistry, March 19, 1903.

March 20. Received sample of water from Dr. J. Archibold, health officer, Cohoes. Ordered examined March 24. Analyzed and reported upon March 28.

March 21. Received sample of water from M. E. Kenyon, secretary board of health, Moravia. Ordered examined March 24. Analyzed and reported upon March 28.

April 7. Received two samples of water from Dr. E. L. Ford, health officer, Lexington. Ordered examined April 6. Analyzed and reported upon April 13.

April 7. Received sample of water from Dr. W. J. Carr, health officer, Newburgh. Ordered examined April 8. Analyzed and reported upon April 13.

April 11. Received sample of water from Dr. J. M. Townsend, health officer, Trumansburg. Ordered examined April 9. Analyzed and reported upon April 18.

April 11. Received sample of water from Dr. E. R. Osterhout, Trumansburg. Ordered examined April 9. Analyzed and reported upon April 18.

May 2. Received sample of water from Dr. W. J. Rosen, health officer, Canajoharie. Ordered examined May 4. Analyzed and reported upon May 11.

May 11. Received sample of water from Dr. E. Torrey, health officer, Allegany. Ordered examined May 13. Analyzed and reported upon May 16.

May 29. Received sample of water from Dr. A. O. Bogert, health officer, Congers. Ordered examined June 2. Analyzed and reported upon June 10.

June 2. Received sample of water from Dr. W. N. Thayer, Peru. Ordered examined June 3. Analyzed and reported upon June 10.

June 10. Received two samples of water from Hon. J. H. B. Mongin, deputy secretary of state, Albany, from Cayuga and Seneca Lakes. Ordered examined June 10. Analyzed and reported upon June 13.

June 19. Received three samples of sewage from sewage disposal plant at White Plains. Analyzed by order and reported upon June 30.

June 19. Received sample of water from Dr. H. E. Cooley, Angelica. Ordered examined June 19. Analyzed and reported upon June 30.

July 2. Received sample of water from S. W. Murray, Binghampton. Ordered examined July 2. Analyzed and reported upon July 6.

July 9. Received sample of water from Dr. E. M. Austin, Tupper Lake. Ordered examined July 9. Analyzed and reported upon July 18.

July 9. Received various samples of "stones, also of loose material and pulp," forwarded by Professor O. H. Landreth from Lake Champlain. These samples were subsequently examined by order and reported upon as follows:

ALBANY, *August* 14, 1903

T. A. STUART, Esq., *Acting Commissioner New York State Department of Health, Albany:*

Dear Sir.—Referring to the "samples of stones, also of loose material and pulp," submitted by Prof. O. H. Landreth, C. E., and received by me on July 9 last, of which an examination was directed with a view to determining the nature of the coating upon the stones and of the loose material, I would report that, in my opinion, no chemical examination is likely to give a satisfactory answer to the question which I understand to be involved in this case, viz, whether the deposit results from the discharges of manufacturing waste from certain mills in the vicinity of Lake Champlain from the shores of which the stones were taken. The matter therefore lies outside of my own line of work, but I have made a microscopical examination of the samples submitted, including the sample of pulp, and have compared these with other samples of similar material. The pulp mainly consists of clean, twisted and more or less interlacing fibres, and it is of very uniform structure. The coating upon the stones consists of vegetable debris, silicious particles and unidentifiable material, and, so far as observed, is similar in its nature in each case, excepting that the deposit upon the stone marked No. 4 consists more largely of mineral (apparently siliceous) particles. I am unable to identify with certainty any wood fibres or fragments of wood in the coating upon any of the samples examined and do not feel justified in saying that this material is of the nature of the matter composing the sample of pulp submitted with the samples

Very respectfully yours
WILLIS G. TUCKER
Director

July 10. Received sample of water from Dr. C. S. Van Etten, health officer, Rhinebeck. Ordered examined July 10. Analyzed and reported upon July 18.

July 18. Received sample of water from Dr. D. C. Lowenstine, Rye. Ordered examined July 18. Analyzed and reported upon July 22.

July 23. Reeceived two samples of water from Dr. J. N. Wright, Grand Gorge. Ordered examined July 27. Analyzed and reported upon July 31.

July 24. Received sample of "signal oil" from Board of Railroad Commissioners. Ignition point determined and found to be 300 degrees F. Reported on same August 1.

July 31. Received sample of water from Dr. E. B. Belknap, health officer, Wyoming. Ordered examined July 31. Analyzed and reported upon August 5.

August 19. Received five samples of water from Dr. D. C. Lowenstine, Rye. Ordered examined August 20. Analyzed and reported upon August 29. Report accompanied by letter concerning samples as follows:

ALBANY, *August* 29, 1903

DR. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany, N. Y.:*

Dear Sir—I respectfully enclose herewith reports upon the analysis of five samples of water received on the 19th instant by your order from Dr. D. C. Lowenstine, Rye, N. Y., and described by him as "taken from different sections of the village of Rye," which he states to be supplied from Greenwich, Conn. The samples were contained in stone jugs, which are improper containers for waters intended for analysis.

The samples present very slight differences only. It is evidently surface water and, as such, it is of fairly good quality as judged by our ordinary standards. Its appearance is fairly satisfactory and it is free from odor. Chlorine not excessive; ammonias not excessive for surface water, although somewhat higher in No. 713 than in the other samples; nitrites and nitrates are absent from all and the waters show little evidence of pollution other than that of vegetable origin.

It should be added, however, that if the quality of the public supply to the village of Rye is questioned, or under discussion, too much dependance should not be placed upon the examination of a single lot of samples, but a proper inspection of the source and surroundings of the supply should be made, and more extended analysis of samples of the water taken from different points may be advisable.

Very respectfully yours
WILLIS G. TUCKER
Director

August 29. Received a sample of extract of vanilla for examination from the office of the Department and examined same and reported as follows:

ALBANY, *September* 15, 1903

Dr. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany:*

Dear Sir—On the 29th of August last I received from Mr. T. A. Stuart, acting commissioner of health, a sample of extract of vanilla, together with a copy of a letter addressed to the department by Messrs. McMonagle and Rogers, of Middletown, N. Y., from whom the sample had been received, complaining that it was an adulterated article and asking that an analysis be made of it. In conformity with the instructions of the acting commissioner I would respectfully report as follows:

The sample was contained in the original bottle, which was enclosed in a paper carton. The bottle was labeled: "——— Pure Concentrated Extract of Vanilla * * * manufactured by the ——— Company, Richmond, Va." The capacity of the bottle was but about 24 cubic centimeters, which is considerably below the usual size. On analysis it yields of vanillin, 0.1710 gram in 100 cubic centimeters, or approximately 0.17 per cent. It contains no cumarin and is entitled to be ranked as "not adulterated" in my opinion. We have as yet established no standard for this article, but judged by that of other states, as Massachusetts, it is of satisfactory quality. The quantity submitted was barely sufficient to make the determinations above stated and insufficient for any other determinations, but under the circumstances I do not deem further examination necessary.

Very respectfully yours
WILLIS G. TUCKER
Director

September 2. Received sample of water from W. C. Russ, secretary board of health, Wellsville. Ordered examined September 1. Analyzed and reported upon September 5.

September 10. Received a sample of cake which had been forwarded by Dr. L. A. Harris, health officer, Newburgh, and thought to be poisoned. Examination ordered September 10. Examination made and reported upon as follows:

ALBANY, *September* 15, 1903

DR. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany:*

Dear Sir—On the 10th instant I received from you by messenger a paper package containing a pasteboard box which, from the marks upon it, appeared to have been mailed to the Department of Health from Newburgh, N. Y. The package had been opened, and the box reenclosed in the original wrapper, and then wrapped in brown paper and tied with twine. The package was accompanied by a communication directing an examination of its contents, and enclosing a copy of a letter addressed to the department by Dr. Louis A. Harris, health officer of the town of Newburgh, of Newburgh, N. Y., stating that he had sent to the department by mail "two samples of cake," and that he had "reason to believe that they contain poison," and asking that an examination be made of them. This letter was dated September 6, 1903. In conformity with your instructions I have examined the cake submitted and would respectfully report as follows:

The box contained fragments of two kinds of cake, one of them light-colored, and the other dark and containing fruit. They were mixed together and wrapped in a Japanese paper napkin. The cake presented no peculiar appearances, nor had it any peculiar oder. It was somewhat dry and was free from mould. Portions of each kind of the cake, weighing in all 25 grams, were submitted to analysis for the purpose of determining the presence of poison of a metallic nature, but no traces of either arsenic, antimony, mercury or silver or other metallic poison were detected. No indications of the presence of phosphorus, carbolic acid, hydrocyanic acid or cyanides were observed, and the same may be said of mineral acids and alkalies, none of which could indeed be present in any quantity and escape detection by inspection and easily applied tests. No search was made for poisonous alkaloids, or other poisons of vegetable origin. This would have involved a very extended examination which I did not feel justified in undertaking in the absence of special instructions to enter upon it. And it will be readily understood that any examination which should include all poisons—mineral, vegetable and animal—is scarcely practicable under any circumstances, and that such examination, if attempted, would necessarily be a very elaborate and expensive undertaking and one which would consume a large amount of time.

Should you deem it expedient to carry this investigation further please to inform me.

Yours very respectfully
WILLIS G. TUCKER
Director

September 15. Received three samples of water from Dr. O. J. Hallenbeck, health officer, Canandaigua. Ordered examined September 18. Analyzed and reported upon September 30.

September 17. Received two samples of water from Dr. L. P. Cooley, health officer, Clifton Springs. Ordered examined September 19. Analyzed and reported upon September 30.

September 18. Received two samples of water from W. S. Russell, health officer, Highland Mills. Ordered examined September 19. Analyzed and reported upon September 30.

September 23. Received sample of water from Dr. J. L. Hanmer, health officer, Middletown. Ordered examined September 25. Analyzed and reported upon September 30.

September 23. Received five samples of water from W. H. Hilton, Newburgh. Ordered examined September 24. Analyzed and reported upon September 30.

October 14. Received four samples of water from Dr. O. J. Hallenbeck, health officer, Canandaigua. Ordered examined October 16. Analyzed and reported upon October 23.

October 26. Received a sample of corned beef from Mr. Wilson Huff, of Rome, the eating of which was thought to have caused illness. The sample was examined by order and report upon same made as follows:

ALBANY, *November* 5, 1903.

Dr. DANIEL LEWIS, *Commissioner N. Y. State Department of Health, Albany, N. Y.:*

Dear Sir.—On October 26 last I received from you by messenger an unsealed package containing a cardboard box which enclosed a sample of corned beef that had been sent by mail addressed to "State Board of Health, Albany, N. Y.", together with a communication of same date directing an examination thereof, and stating that the sample had been sent "by Wilson Huff, of Rome, N. Y., in compliance with instructions from the health officer, Dr. H. C. Sutton." A newspaper clipping, dated October 21, which had been sent by Mr. Huff, was enclosed, and this stated that: "There was reported to Health Officer Sutton to-day five cases of ptomaine poisoning which the physician attending the patients thinks came from eating pressed corned beef purchased from a local butcher."

I opened the package and inspected the contents as soon as received. It contained a piece of pressed meat, apparently corned beef, weighing about 67 grams. The meat, as received by me, was of firm texture, neither much dried nor softened, nor was it mouldy, but it exhaled a very disagreeable odor indicative of incipient putrefaction, and in its then condition was obviously unfit for use as food. It has of course been known for many years that various animal foods like sausage meat, ham, head-cheese, various kinds of fish and shell-fish, and dairy products also, may, when eaten at times, give rise to a train of symptoms closely resembling those caused by irritant metallic poisons. There may be vomiting, purging, cramps, muscular prostration, cold sweats, feeble action of the heart, collapse, and even death in some cases may result. Such symptoms have often been ascribed to the action of some mineral or vegetable irritant poison which has been purposely added to the food, or accidently gained access thereto, but it has been known for years that such symptoms may be caused by the presence of products resulting from the action of putrefactive bacteria upon albuminous matter. Such products are known as putrefactive alkaloids or ptomaines, and many of these have been isolated, although their real nature is by no means well understood. Toxic products of this nature are not necessarily always present in animal products in which putrefaction has set in or has progressed, and it is a familiar fact that food which is undergoing decay may often be eaten with impunity. These substances are in many cases very unstable and for this, and other reasons, their separation and positive identification is always attended with difficulty and is sometimes quite impossible.

For the successful isolation of putrefactive alkaloids a comparatively large quantity of material is ordinarily essential. In this instance the quantity submitted to me was small, but an attempt was nevertheless made to isolate some ptomaine therefrom since the facts in the case were thought to indicate the presence of some poison of this class. The Stas-Otto method, in which the material after acidification is first extracted with alcohol, and the final extraction made with ether, was employed, but the results were not positive. Portions of the final ether extract were tested with potassium ferricyanide and ferric chloride, but no evidence of reduction was obtained, and with ether reagents portions of the final extract gave similar negative results. When the liability of these bodies to undergo decomposition, and the difficulty of extracting them, especially when small amounts of material are operated upon, is borne in mind, it will be seen that negative results do not necessarily prove their absence. And in this instance it can only be said that no positive proof of their presence could be obtained.

As it was thought to be not entirely impossible that the symptoms attributed to the supposed presence of ptomaines might have been caused by some irritant mineral poison, a search for such was made, but no trace of arsenic, antimony or other metallic poison was detected. When vomiting, purging and similar symptoms follow closely upon the ingestion of food they are often attributed to the presence of copper or zinc which it is thought may have gained access to the food eaten, from some vessel of brass, copper, zinc, galvanized iron or enameled ware, in which the article has been cooked, or from the metal can in which it may have been preserved. but as a matter of fact harmful impregnation of food in this manner is very unlikely to occur, since the compounds of such metals as copper and zinc are actively poisonous only when taken in considerable quantities, and it would be absurd to suppose that minute amounts, perhaps far below a medicinal dose, could give rise to acute poisoning. In this case, however, there is no evidence of the presence of any such metal, nor of any other metallic poison, such as arsenic or antimony, which might accidently have gained access to the meat, or have been added to it purposely with malicious or criminal intent.

Very respectfully yours
WILLIS G. TUCKER
Director

November 23. Received sample of water from Mr. F. R. Lape, trustee of the village of Athens. Examination ordered November 24. Analyzed and reported upon November 30 and letter concerning sample sent therewith as follows:

ALBANY, *November* 30, 1903

DR. DANIEL LEWIS, *Commissioner New York State Department of Health, Albany:*

Dear Sir—I respectfully enclose herewith report in duplicate on the full sanitary analysis of a sample of water received on the 23d instant by your order from Mr. F. R. Lape, trustee, etc., Athens, N. Y. I am informed by Mr. Lape, who delivered the sample to me in person, that the water of the stream from which the sample was taken has been proposed as a possible source of supply for the village of Athens. As will be seen by my report, this water can not be condemned as grossly polluted from a chemical standpoint, but it is by no means of very satisfactory quality and is not to be recommended as of good quality for domestic use. It is to be borne in mind, however, that a single analysis of one sample of water in such a case as this is seldom sufficient to decide such a matter and that before a conclusion is reached it may be advisable to examine different samples taken at different seasons and at various points upon the stream. An inspection of the watershed should also be made by some competent observer and the advice of such expert taken before further samples of the water of this or other streams are taken for further analysis, either chemical or bacteriological.

Very respectfully yours.
WILLIS G. TUCKER
Director

December 10. Received sample of water from Dr. A. E. Wage, health officer, Albion. Ordered examined December 11. Analyzed and reported upon December 15.

December 15. Received sample of water from Dr. H. L. Palmer, superintendent Utica State Hospital. Ordered examined December 16. Analyzed and reported upon December 21.

December 30. Received two samples of formaldehyde solution from Dr. Wallace Clarke, health officer, Utica. Ordered examined December 31. Report upon same made on January 5, 1904, and will be found in the annual report for that year.

December 30. Received three samples of water from Dr. O. J. Hallenbeck, health officer, Canandaigua. Ordered examined December 31. Reported upon January 8, 1904, and reports will be found in the annual report for that year.

WATER ANALYSES

During the year 50 samples of water used for domestic purposes were received, analyzed and reported upon as above stated. The examination has included physical properties (color, turpidity, sediment and odor); chlorine; free and albuminoid ammonias; nitrogen in nitrites, and in nitrates; total solids; loss on ignition and behavior during ignition; mineral matter, and other special determinations as deemed necessary in particular cases. The results obtained have been deemed sufficient for determining fitness for domestic use in most instances. To all senders of samples the following printed instructions have been sent in advance, and in construing the results of the examination the information which has been furnished concerning source of sample, its surroundings and possible contaminations, has been given due weight in forming an opinion as to fitness for use, and this fact will explain why some waters have been condemned which, judged solely by the analytical results, might appear to be of fairly satisfactory quality.

NEW YORK
STATE DEPARTMENT OF HEALTH
ALBANY

CHEMICAL ANALYSIS OF WATER

DIRECTIONS FOR TAKING AND FORWARDING SAMPLES OF WATER

1. Use clean *glass* demijohns of gallon capacity. *Never use stone jugs.*
2. Rinse the demijohns thoroughly several times with the water before filling.
3. Fill with a fair sample of the water to be analyzed, and if dippers, funnels or other vessels are used, see to it that these are clean.
4. Close with a *new and clean cork* which should be well tied down with cord. The ends of the cord may be sealed, but top should not be coated with wax.
5. Accompanying the sample with description of same, stating source, proximity of houses, stables, privies, cesspools, drains or other sources of possible contamination, and if from well, depth, and character of soil. If several samples are sent state whether from same vicinity or same source, and describe fully, stating reasons for selection of the samples. All samples to be properly numbered or otherwise labeled for purpose of identification.
6. Forward without delay, *prepaying all charges*, to Prof. Willis G. Tucker, Director Bureau of Chemistry, Albany Medical College, Albany, N. Y.
7. Make the addressed Tag or Marking secure.

The reports not having been elsewhere published are appended:

No. 688

(Results are parts in 100,000)

Received from Dr. L. A. Gould, health officer, Farmer; date received, January 13, 1903; source, not stated; how labeled, none. Appearance: Color, light greenish tint; turbidity, very slight; sediment, slight. Odor at 100 degrees F., slight; chlorine in chlorides, 7.80; free ammonia, 0.0013; albuminoid ammonia, 0.0065; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 1.8160;

total solids, 83.20; loss on ignition, 27.40; behavior during ignition, darkened slightly; mineral matter, 55.80; remarks, shows evidences of past pollution; not of satisfactory quality.

Dated at bureau of chemistry, January 21, 1903.

No. 689

(Results are parts in 100,000)

Received from Dr. J. A. Reed, health officer, Newark; date received, January 27, 1903; source, well; how labeled, "From Newark, N. Y." Appearance: Color, light greenish tint; turbidity, none; sediment, trifling. Odor at 100 degrees F., none; chlorine in chlorides, 3.50; free ammonia, 0.0000; albuminoid ammonia, 0.0040; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.1680; total solids, 58.20; loss on ignition, 15.60; behavior during ignition, no change; mineral matter, 42.60; remarks, shows evidences of past pollution, but can not be condemned as unfit for use.

Dated at bureau of chemistry, January 31, 1903.

No. 690

(Results are parts in 100,000)

Received from W. J. Roser, president board of health, Canajoharie; date received, February 23, 1903; source, not stated; how labeled, "From Pres. Board of Health, Canajoharie, N. Y." Appearance: Color, greenish tint; turbidity, none; sediment, very slight. Odor at 100 degrees F., none; chlorine in chlorides, 0.70; free ammonia, 0.0075; albuminoid ammonia, 0.0070; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0832; total solids, 27.80; loss on ignition, 8.60; behavior during ignition, no change; mineral matter, 19.20; remarks, fairly good quality; can not be condemned from the analytical results.

Dated at bureau of chemistry, March 6, 1903.

No. 691

(Results are parts in 100,000)

Received from Dr. John Archibold, health officer, Cohoes; date received, March 20, 1903; source, driven well; how labeled, "From

Health Officer Archibold, Cohoes, N. Y." Appearance: Color, nearly colorless; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.30; free ammonia, 0.0240; albuminoid ammonia, 0.0055; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 15.60; loss on ignition, 3.20; behavior during ignition, no change; mineral matter, 12.40; remarks, good quality.

Dated at bureau of chemistry, March 28, 1903.

No. 692

(Results are parts in 100,000)

Received from M. E. Kenyon, secretary board of health, Moravia, N. Y.; date received, March 21, 1903; source, village water supply; how labeled, "Weedsport, N. Y." Appearance: Color, light greenish tint; turbidity, none; sediment, trifling. Odor at 100 degrees F., none; chlorine in chlorides, 0.15; free ammonia, 0.0040; albuminoid ammonia, 0.0055; nitrogen as nitrites, 0.0000; nitrogen at nitrates, 0.1816; total solids, 3.80; loss on ignition, 2.60; behavior during ignition, darkened slightly; mineral matter, 1.20; remarks, good quality.

Dated at bureau of chemistry, March 28, 1903.

No. 693

(Results are parts in 100,000)

Received from Dr. E. L. Ford, health officer, Lexington; date received, April 7, 1903; source, well; how labeled, "No. I, Maginnis well." Appearance: Color, light greenish tint; turbidity, slight; sediment, slight. Odor at 100 degrees F., disagreeable; chlorine in chlorides, 0.90; free ammonia, 0.0035; albuminoid ammonia, 0.0100; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0108; total solids, 16.80; loss on ignition, 7.40; behavior during ignition, blackened, disagreeable odor; mineral matter, 9.40; remarks, shows signs of contamination and unfit for domestic use.

Dated at bureau of chemistry, April 13, 1903.

No. 694

(Results are parts in 100,000)

Received from Dr. E. L. Ford, health officer, Lexington; date received, April 7, 1903; source, well; how labeled, "No. II, Rudolph well." Appearance: Color, greenish yellow tint; turbidity, slight; sediment, slight (flocculent). Odor at 100 degrees F., slight; chlorine in chlorides, 0.80; free ammonia, 0.0035; albuminoid ammonia, 0.0090; nitrogen as nitrites, 0.0360; nitrogen as nitrates, 0.0216; total solids, 9.80; loss on ignition, 4.60; behavior during ignition, darkened, slight odor; mineral matter, 5.20; remarks, not of satisfactory quality.

Dated at bureau of chemistry, April 13, 1903.

No. 695

(Results are parts in 100,000)

Received from Dr. W. J. Carr, health officer, Newburgh; date received, April 7, 1903; source, not stated; how labeled, F. A. Grenzebach, Newburgh, N. Y. Appearance: Color, light greenish tint; turbidity, none; sediment, trifling. Odor at 100 degrees F., none; chlorine in chlorides, 0.20; free ammonia, 0.0035; albuminoid ammonia, 0.0100; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0208; total solids, 2.60; loss on ignition, 1.60; behavior during ignition, darkened; mineral matter, 1.00; remarks, satisfactory quality.

Dated at bureau of chemistry, April 13, 1903.

No. 696

(Results are parts in 100,000)

Received from Dr. E. R. Osterhout, health officer, Trumansburgh; date received, April 11, 1903; source, well; how labeled, "Well of Mrs. R. A. Cowan." Appearance: Color, light greenish tint; turbidity, none; sediment, trifling. Odor at 100 degrees F., peculiar; chlorine in chlorides, 1.90; free ammonia, 0.0020; albuminoid ammonia, 0.0070; nitrogen as nitrites, 0.0064; nitrogen as nitrates, 0.0000; total solids, 42.40; loss on ignition, 13.80;

behavior during ignition, darkened very slightly; mineral matter, 28.60; remarks, advise to discontinue use for domestic purposes.

Dated at bureau of chemistry, April 18, 1903.

No. 697

(Results are parts in 100,000)

Received from Dr. J. M. Townsend, health officer, Trumansburgh; date received, April 11, 1903; source, well; how labeled, "From well of Mrs. C. E. Doty, privy 15 feet from well." Appearance: Color, light greenish tint; turbidity, none; sediment, trifling. Odor at 100 degrees F., aromatic; chlorine in chlorides, 2.70; free ammonia, 0.0005; albuminoid ammonia, 0.0035; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 45.80; loss on ignition, 8.60; behavior during ignition, darkened slightly; mineral matter, 37.20; remarks, satisfactory quality.

Dated at bureau of chemistry, April 18, 1903.

No. 698

(Results are parts in 100,000)

Received from W. J. Roser, president board of health, Canajoharie; date received, May 2, 1903; source, well. Appearance: Color, light greenish tint; turbidity, none; sediment, very slight. Odor at 100 degrees F., none; chlorine in chlorides, 7.10; free ammonia, 0.0040; albuminoid ammonia, 0.0050; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.5560; total solids, 85.80; loss on ignition, 29.40; behavior during ignition, no change; mineral matter, 56.40; remarks, fairly good, but not altogether satisfactory quality.

Dated at bureau of chemistry, May 11, 1903.

No. 699

(Results are parts in 100,000)

Received from Dr. Edward Torrey, health office, Allegany; date received, May 11, 1903; source, well; how labeled, "From

Dr. Edw. Torrey, Allegany, N. Y." Appearance: Color, almost colorless; turbidity, none; sediment, trifling. Odor at 100 degrees F., none; chlorine in chlorides, 1.90; free ammonia, 0.0025; albuminoid ammonia, 0.0035; nitrogen as nitrites, 0.0040; nitrogen as nitrates, 0.9080; total solids, 27.80; loss on ignition, 9.40; behavior during ignition, no change; mineral matter, 18.40; remarks, advise to discontinue use for domestic purposes.

Dated at bureau of chemistry, May 16, 1903.

No. 700.

(Results are parts in 100,000)

Received from Dr. A. O. Bogert, health officer, Congers; date received, May 23, 1903; source, not stated; how labeled, "creek water." Appearance: Color, decidedly brownish tint; turbidity, very slight; sediment, slight. Odor at 100 degrees F., none; chlorine in chlorides, 1.60; free ammonia, 0.0115; albuminoid ammonia, 0.0085; nitrogen as nitrites, 0.0012; nitrogen as nitrates, 0.0116; total solids, 11.20; loss on ignition, 3.60; behavior during ignition, blackened; mineral matter, 7.60; remarks, not recommended for domestic use.

Dated at bureau of chemistry, June 10, 1903.

No. 701.

(Results are parts in 100,000)

Received from Dr. W. N. Thayer, Peru, N. Y.; date received, June 2, 1903; source, water from Ausable river, below Jas. Bogg's farm; how labeled, "from Dr. W. N. Thayer, Peru, N. Y." Appearance: Color, decidedly brownish tint; turbidity, slight; sediment, slight. Odor at 100 degrees F., none; chlorine in chlorides, 0.20; free ammonia, 0.0015; albuminoid ammonia, 0.0085; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0224; total solids, 16.80; loss on ignition, 8.60; behavior during ignition, blackened; mineral matter, 8.20; remarks, can not be condemned as unfit for use.

Dater at bureau of chemistry, June 10, 1903.

No. 702.

(Results are parts in 100,000)

Received from State Department of Health office; date received, June 10, 1903; source, Seneca Lake water; how labeled, "Seneca Lake water." Appearance: Color, nearly colorless; turbidity, none; sediment, trifling. Odor at 100 degrees F., none; chlorine in chlorides, 4.40; free ammonia, 0.0020; albuminoid ammonia, 0.0085; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0316; total solids, 21.20; loss on ignition, 5.40; behavior during ignition, darkened slightly; mineral matter, 15.80; remarks, of a good quality for a surface water.

Dated at bureau of chemistry, June 13, 1903.

No. 703.

(Results are parts in 100,000)

Received from State Department of Health office; date received, June 10, 1903; source, Cayuga Lake water; how labeled, "Cayuga Lake water." Appearance: Color, light greenish tint; turbidity, very slight; sediment, trifling. Odor at 100 degrees F., none; chlorine in chlorides, 2.80; free ammonia, 0.0040; albuminoid ammonia, 0.0065; nitrogen as nitrites, 0.0004; nitrogen as nitrates, 0.0244; total solids, 20.40; loss on ignition, 7.20; behavior during ignition, darkened; mineral matter, 13.20; remarks, aside from presence of nitrites is of good quality for a surface water.

Dated at bureau of chemistry, June 13, 1903.

No. 704

(Results are parts in 100,000)

Received from Angelica, N. Y.; date received, June 19, 1903; source, Angelica water system; how labeled, "H. E. Cooley, M. D., Angelica, N. Y." Appearance: Color, light greenish tint; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.15; free ammonia, 0.0005; albuminoid ammonia, 0.0015; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0768; total solids, 9.80; loss on ignition, 2.80; behavior during ignition, no change; mineral matter, 7.00; remarks, good quality.

Dated at bureau of chemistry, June 30, 1903.

No. 705

(Results are parts in 100,000)

Received from S. W. Murray, Binghamton; date received, July 2, 1903; source, well sunk in rock, 150 feet deep, in Nanticoke valley; how labeled, "From S. W. Murray, Binghamton, N. Y." Appearance: Color, light greenish tint; turbidity, opaque; sediment, considerable. Odor at 100 degrees F., slight; chlorine in chlorides, 60.40; free ammonia, 0.0090; albuminoid ammonia, 0.0030; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 211.60; loss on ignition, 105.80; behavior during ignition, no change; mineral matter, 105.80; remarks, contains too much salt and other mineral matter to be satisfactory for domestic use.

Dated at bureau of chemistry, July 6, 1903.

No. 706

(Results are parts in 100,000)

Received from Dr. E. M. Austin, Tupper Lake; date received, July 8, 1903; source, not stated; how labeled, "From Dr. E. M. Austin." Appearance: Color, brownish tint; turbidity, none; sediment, trifling. Odor at 100 degrees F., none; chlorine in chlorides, 0.10; free ammonia, 0.0035; albuminoid ammonia, 0.0120; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0256; total solids, 4.20; loss on ignition, 2.60; behavior during ignition, blackened; mineral matter, 1.60; remarks, not entirely satisfactory.

Dated at bureau of chemistry, July 18, 1903.

No. 707

(Results are parts in 100,000)

Received from Dr. C. S. Van Etten, health officer, Rhinebeck; date received, July 10, 1903; source, well; how labeled, "Water from well of James Brice." Appearance: Color, nearly colorless; turbidity, none; sediment, trifling. Odor at 100 degrees F., slight (peculiar); chlorine in chlorides, 1.30; free ammonia, 0.0030; albuminoid ammonia, 0.0130; nitrogen as nitrites, 0.0008; nitrogen as nitrates, 0.1664; total solids, 31.60; loss on ignition, 16.40; behavior during ignition, strongly blackened, peculiar odor; mineral matter, 15.20; remarks, unsatisfactory quality.

Dated at bureau of chemistry, July 18, 1903.

No. 708

(Results are parts in 100,000)

Received from Dr. D. C. Lowenstine, health officer, Rye; date received, July 17, 1903; source, spring on Oakland Beach, Rye, N. Y.; how labeled, "From Rye, N. Y." Appearance: Color, light greenish tint; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 3.10; free ammonia, 0.0030; albuminoid ammonia, 0.0050; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.2220; total solids, 20.80; loss on ignition, 2.20; behavior during ignition, no change; mineral matter, 18.60; remarks, not entirely satisfactory.

Dated at bureau of chemistry, July 22, 1903.

No. 709

(Results are parts in 100,000)

Received from Dr. J. N. Wright, Grand Gorge, N. Y.; date received, July 23, 1903; source, artesian well 126 feet deep; how labeled, "Sample No. 1, Harley well." Appearance: Color, light greenish tint; turbidity, very slight; sediment, slight. Odor at 100 degrees F., none; chlorine in chlorides, 19.40; free ammonia, 0.0045; albuminoid ammonia, 0.0050; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 44.80; loss on ignition, 5.20; behavior during ignition, no change; mineral matter, 39.60; remarks, of fairly satisfactory quality.

Dated at bureau of chemistry, July 31, 1903.

No. 710

(Results are parts in 100,000)

Received from Dr. J. N. Wright, Grand Gorge, N. Y.; date received, July 23, 1903; source, recently bored well, 166 feet deep; how labeled, "Sample No. 2, Creamery well." Appearance: Color, peculiar pink tint; turbidity, opaque; sediment, slight. Odor at 100 degrees F., slight (peculiar); chlorine in chlorides, 2.10; free ammonia, 0.0020; albuminoid ammonia, 0.0050; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 42.20; loss on ignition, 6.80; behavior during ignition, darkened slightly, color not destroyed; mineral matter, 35.40; remarks, unfit for use in present condition.

Dated at bureau of chemistry, July 31, 1903.

No. 711

(Results are parts in 100,000)

Received from Dr. E. B. Belknap, health physician, Wyoming; date received, July 31, 1903; source, not stated; how labeled, "From Dr. E. B. Belknap." Appearance: Color, greenish yellow tint; turbidity, slight; sediment, considerable, brownish, which turned black on standing. Odor at 100 degrees F., highly offensive; chlorine in chlorides, 2.30; free ammonia, 0.2850; albuminoid ammonia, 0.5850; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 166.80; loss on ignition, 80.60; behavior during ignition, strongly blackened, foul odor; mineral matter, 86.20; remarks, largely polluted and entirely unfit for use.

Dated at bureau of chemistry, August 5, 1903.

No. 712

(Results are parts in 100,000)

Received from Dr. D. C. Lowenstine, Rye, N. Y.; date received, August 19, 1903; source, village supply; how labeled, "1." Appearance: Color, greenish tint; turbidity, none; sediment, very slight. Odor at 100 degrees F., none; chlorine in chlorides, 0.30; free ammonia, 0.0015; albuminoid ammonia, 0.0095; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 4.40; loss on ignition, 2.60; behavior during ignition, blackened; mineral matter, 1.80; remarks, fairly good for surface water.

Dated at bureau of chemistry, August 29, 1903.

No. 713

(Results are parts in 100,000)

Received from Dr. D. C. Lowenstine, Rye, N. Y.; date received, August 19, 1903; source, village supply; how labeled, "2." Appearance: Color, greenish tint; turbidity, none; sediment, slight. Odor at 100 degree F., none; chlorine in chlorides, 0.30; free ammonia, 0.0020; albuminoid ammonia, 0.0135; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 4.60; loss on ignition, 2.60; behavior during ignition, blackened; mineral matter, 2.00; remarks, fair quality for surface water.

Dated at bureau of chemistry, August 29, 1903.

No. 714

(Results are parts in 100,000)

Received from Dr. D. C. Lowenstine, Rye, N. Y.; date received August 19, 1903; source, village supply; how labeled, "3." Appearance: Color, greenish tint; turbidity, none; sediment, slight. Odor at 100 degrees F., none; chlorine in chlorides, 0.30; free ammonia, 0.0015; albuminoid ammonia, 0.0090; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 5.60; loss on ignition, 2.40; behavior during ignition, blackened; mineral matter, 3.20; remarks, fair quality for surface water.

Dated at bureau of chemistry, August 29, 1903.

No. 715

(Results are parts in 100,000)

Received from Dr. D. C. Lowenstine, Rye, N. Y.; date received, August 19, 1903; source, village supply; how labeled, "4." Appearance: Color, greenish tint; turbidity, none; sediment, very slight. Odor at 100 degrees F., none; chlorine in chlorides, 0.30; free ammonia, 0.0015; albuminoid ammonia, 0.0085; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 4.40; loss on ignition, 1.80; behavior during ignition, blackened; mineral matter, 2.60; remarks, fair quality for surface water.

Dated at bureau of chemistry, August 29, 1903.

No. 716

(Results are parts in 100,000)

Received from Dr. D. C. Lowenstine, Rye, N. Y.; date received, August 19, 1903; source, village supply; how labeled, "5." Appearance: Color, greenish tint; turbidity, none; sediment, slight. Odor at 100 degrees F., none; chlorine in chlorides, 0.30; free ammonia, 0.0015; albuminoid ammonia, 0.0090; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0000; total solids, 3.80; loss on ignition, 1.80; behavior during ignition, blackened; mineral matter, 2.00; remarks, fair quality for surface water.

Dated at bureau of chemistry, August 29, 1903.

No. 717

(Results are parts in 100,000)

Received from W. C. Russ, secretary board of health, Wellsville; date received, September 2, 1903; source, water main of the village; how labeled, "Wellsville, N. Y." Appearance: Color, light greenish; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.70; free ammonia, 0.0005; albuminoid ammonia, 0.0040; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0528; total solids, 19.20; loss on ignition, 6.40; behavior during ignition, darkened; mineral matter, 12.80; remarks, satisfactory quality.

Dated at bureau of chemistry, September 5, 1903.

No. 718

(Results are parts in 100,000)

Received from Dr. O. J. Hallenbeck, health officer, Canandaigua; date received, September 15, 1903; source, Canandaigua Lake, 50 feet below surface; how labeled, "Deep—Canandaigua Lake water—at pump house." Appearance: Color, light greenish tint; turbidity, none; sediment, trifling. Odor at 100 degrees F., none; chlorine in chlorides, 0.30; free ammonia, 0.0135; albuminoid ammonia, 0.0130; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0310; total solids, 16.80; loss on ignition, 5.20; behavior during ignition, blackened; mineral matter, 11.60; remarks, not of satisfactory quality.

Dated at bureau of chemistry, September 30, 1903.

No. 719

(Results are parts in 100,000)

Received from Dr. O. J. Hallenbeck, health officer, Canandaigua; date received, September 15, 1903; source Canandaigua Lake, 6 feet below surface; how labeled, "Surface—Canandaigua Lake water—at pump house." Appearance: Color, light greenish tint; turbidity, very slight; sediment, slight, flocculent. Odor at 100 degrees F., slight; chlorine in chlorides, 0.30; free ammonia, 0.0090; albuminoid ammonia, 0.0100; nitrogen as nitrites, 0.0016; nitrogen as nitrates, 0.0000; total solids, 13.20; loss on ignition, 4.60; behavior during ignition, blackened; mineral matter, 8.60; remarks, aside from presence of nitrites is better than No. 718, but not of very satisfactory quality.

Dated at bureau of chemistry, September 30, 1903.

No. 720

(Results are parts in 100,000)

Received from Dr. O. J. Hallenbeck, health officer, Canandaigua; date received, September 15, 1903; source Canandaigua water supply; how labeled, "Reservoir, Canandaigua Water works." Appearance: Color, decided brownish tint; turbidity, slight; sediment, considerable, flocculent. Odor at 100 degrees F., slight; chlorine in chlorides, 0.30; free ammonia, 0.0335; albuminoid ammonia, 0.0195; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0330; total solids, 13.60; loss on ignition, 5.80; behavior during ignition, blackened; mineral matter, 7.80; remarks, unsatisfactory quality.

Dated at bureau of chemistry, September 30, 1903.

No. 721

(Results are parts in 100,000)

Received from Dr. L. P. Conley, health officer, Clifton Springs; date received, September 17, 1903; source, village water; how labeled, "No. I". Appearance: Color, greenish yellow tint; turbidity, distinct; sediment, slight, flocculent. Odor at 100 degrees F., peculiar; chlorine in chlorides, 0.50; free ammonia, 0.0055; albuminoid ammonia, 0.0160; nitrogen as nitrites, 0.1300; nitrogen as nitrates, 0.0950; total solids, 31.40; loss on ignition, 6.60; behavior during ignition, darkened; mineral matter, 24.80; remarks, unsatisfactory quality.

Dated at bureau of chemistry, September 30, 1903.

No. 722

(Results are parts in 100,000)

Received from Dr. L. P. Conley, health officer, Clifton Springs; date received, September 17, 1903; source, well; how labeled, "No. II". Appearance: Color, none; turbidity, none; sediment, trifling. Odor at 100 degrees F., none; chlorine in chlorides, 22.20; free ammonia, 0.0005; albuminoid ammonia, 0.0050; nitrogen as nitrites, 0.0004; nitrogen as nitrates, 0.1332; total solids, 85.20; loss on ignition, 13.80; behavior during ignition, no change; mineral matter, 71.40; remarks, a peculiar water, not well suited for domestic use.

Dated at bureau of chemistry, September 30, 1903.

No. 723

(Results are parts in 100,000)

Received from Dr. W. S. Russell, health officer, Highland Mills; date received, September 18, 1903; source, Cromwell Lake; how labeled, "Lake water". Appearance: Color, light greenish tint; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.30; free ammonia, 0.0000; albuminoid ammonia, 0.0025; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0080; total solids, 2.20; loss on ignition, 1.00; behavior during ignition, darkened slightly; mineral matter, 1.20; remarks, excellent quality.

Dated at bureau of chemistry, September 30, 1903.

No. 724.

(Results are parts in 100,000)

Received from Dr. W. S. Russell, health officer, Highland Mills; date received, September 18, 1903; source, well in center of village of Central Valley; how labeled, "well water." Appearance: Color, nearly colorless; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.90; free ammonia, 0.0005; albuminoid ammonia, 0.0020; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.2284; total solids, 21.60; loss on ignition, 2.20; behavior during ignition, darkened slightly; mineral matter, 19.40; remarks, under conditions existing advise to discontinue the present use of this water for domestic purposes.

Dated at bureau of chemistry, September 30, 1903.

No. 725.

(Results are parts in 100,000)

Received from W. H. Hilton, Newburgh; date received, September 23, 1903; source, not stated; how labeled, "Sample A." Appearance: Color, nearly colorless; turbidity, none; sediment, none. Odor at 100 degrees F., very slight; chlorine in chlorides, 1.10; free ammonia, 0.0035; albuminoid ammonia, 0.0115; nitrogen as nitrites, 0.0480; nitrogen as nitrates, 0.3332; total solids, 30.80; loss on ignition, 7.60; behavior during ignition, darkened slightly; mineral matter, 23.20; remarks, unsatisfactory quality and not recommended for domestic use.

Dated at bureau of chemistry, September 30, 1903.

No. 726.

(Results are parts in 100,000)

Received from W. H. Hilton, Newburgh; date received, September 23, 1903; source, not stated; how labeled, "Sample B." Appearance: Color, nearly colorless; turbidity, none; sediment, none.

Odor at 100 degrees F., none; chlorine in chlorides, 0.20; free ammonia, 0.0020; albuminoid ammonia, 0.0070; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.1536; total solids, 21.40; loss on ignition, 3.80; behavior during ignition, no change; mineral matter, 17.60; remarks, fairly satisfactory quality.

Dated at bureau of chemistry, September 30, 1903.

No. 727.

(Results are parts in 100,000)

Received from W. H. Hilton, Newburgh; date received, September 23, 1903; source, not stated; how labeled, "Sample C." Appearance: Color, nearly colorless; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 3.10; free ammonia, 0.0025; albuminoid ammonia, 0.0070; nitrogen as nitrites, 0.0021; nitrogen as nitrates, 0.5880; total solids, 35.80; loss on ignition, 12.20; behavior during ignition, no change; mineral matter, 23.60; remarks, unsatisfactory quality and not recommended for domestic use.

Dated at bureau of chemistry, September 30, 1903.

No. 728.

(Results are parts in 100,000)

Received from W. H. Hilton, Newburgh; date received, September 23, 1903; source, not stated; how labeled, "Sample D." Appearance: Color, nearly colorless; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.10; free ammonia, 0.0010; albuminoid ammonia, 0.0040; nitrogen, as nitrites, 0.0000; nitrogen as nitrates, 0.0444; total solids, 3.40; loss on ignition, 1.20; behavior during ignition, no change; mineral matter, 2.20; remarks, good quality.

Dated at bureau of chemistry, September 30, 1903.

No. 729

(Results are parts in 100,000)

Received from W. H. Hilton, Newburgh; date received, September 23, 1903; source, not stated; how labeled, "Sample E." Appearance: Color, nearly colorless; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.15; free ammonia, 0.0015; albuminoid ammonia, 0.0040; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.3640; total solids, 26.80; loss on ignition, 6.40; behavior during ignition, no change; mineral matter, 20.40; remarks, fairly satisfactory quality.

Dated at bureau of chemistry, September 30, 1903.

No. 730

(Results are parts in 100,000)

Received from Dr. J. L. Hanmer, health officer, Middletown; date received, September 23, 1903; source, well; how labeled, "Middletown, N. Y." Appearance: Color, light brownish tint; turbidity, slight; sediment, slight. Odor at 100 degrees F., none; chlorine in chlorides, 1.00; free ammonia, 0.0075; albuminoid ammonia, 0.0140; nitrogen as nitrites, 0.0006; nitrogen as nitrates. 0.4760; total solids, 39.60; loss on ignition, 15.40; behavior during ignition, darkened, slight odor; mineral matter, 24.20; remarks, unsatisfactory and unfit for domestic use.

Dated at bureau of chemistry, September 30, 1903.

No. 731

(Results are parts in 100,000)

Received from Dr. O. J. Hallenbeck, health officer, Canandaigua; date received, October 14, 1903; source, Canandaigua lake; how labeled, "Intake, Canandaigua Lake." Appearance: Color, light greenish tint; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.30; free ammonia, 0.0145; albuminoid ammonia, 0.0185; nitrogen as nitrites. 0.0007; nitrogen as nitrates, 0.0332; total solids, 13.40; loss on ignition, 3.20; behavior during ignition, darkened; mineral matter, 10.20; remarks, not of satisfactory quality.

Dated at bureau of chemistry, October 23, 1903.

No. 732

(Results are parts in 100,000)

Received from Dr. O. J. Hallenbeck, health officer, Canandaigua; date received, October 14, 1903; source, Canandaigua lake; how labeled, "East, Canandaigua Lake." Appearance: Color, light greenish tint; turbidity, none; sediment, none. Odor at 100 degrees F., slight; chlorine in chlorides, 0.30; free ammonia, 0.0035; albuminoid ammonia, 0.0095; nitrogen as nitrites, 0.0006; nitrogen as nitrates, 0.0368; total solids, 12.40; loss on ignition, 2.60; behavior during ignition, darkened; mineral matter, 9.80; remarks, better than No. 731, but not of very satisfactory quality.

Dated at bureau of chemistry, October 23, 1903.

No. 733

(Results are parts in 100,000)

Received from Dr. O. J. Hallenbeck, health officer, Canandaigua; date received, October 14, 1903; source, Canandaigua lake; how labeled, "South, Canandaigua Lake." Appearance: Color, light greenish tint; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.25; free ammonia, 0.0055; albuminoid ammonia, 0.0120; nitrogen as nitrites, 0.0006; nitrogen as nitrates, 0.0356; total solids, 12.80; loss on ignition, 3.60; behavior during ignition, darkened; mineral matter, 9.20; remarks, better than No. 731, but not of very satisfactory quality.

Dated at bureau of chemistry, October 23, 1903.

No. 734

(Results are parts in 100,000)

Received from Dr. O. J. Hallenbeck, health officer, Canandaigua; date received, October 14, 1903; source, Canandaigua lake; how labeled, "North, Canandaigua Lake." Appearance: Color, light greenish tint; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.20; free ammonia, 0.0035; albuminoid ammonia, 0.0080; nitrogen as nitrites, 0.0004; nitrogen as nitrates, 0.0344; total solids, 13.20; loss on ignition, 3.80; behavior during ignition, darkened; mineral matter, 9.40; remarks, aside from presence of nitrites of fairly satisfactory quality.

Dated at bureau of chemistry, October 23, 1903.

No. 735

(Results are parts in 100,000)

Received from F. R. Lape, trustee, etc., Athens; date received, November 23, 1903; source, Vosenkill, taken 4½ miles west of Athens. Appearance: Color, greenish-yellow tint; turbidity, very slight; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.10; free ammonia, 0.0075; albuminoid ammonia, 0.0065; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.0256; total solids, 22.40; loss on ignition, 3.80; behavior during ignition, darkened slightly; remarks, not to be recommended as a source of public supply.

Dated at bureau of chemistry, November 30, 1903.

No. 736

(Results are parts in 100,000)

Received from Dr. A. E. Wage, health officer, Albion; date received, December 10, 1903; source, drilled wells, village supply; how labeled, "Water from Village of Albion Water Works Co." Appearance: Color, nearly colorless; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 1.70; free ammonia, 0.0000; albuminoid ammonia, 0.0025; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.2220; total solids, 31.40; loss on ignition, 7.20; behavior during ignition, no change; mineral matter, 24.20; remarks, excellent quality.

Dated at bureau of chemistry, December 15, 1903.

No. 737

(Results are parts in 100,000)

Received from Dr. H. L. Palmer, superintendent Utica State Hospital; date received, December 15, 1903; source, hospital supply; how labeled, "From Utica State Hospital." Appearance:

Color, none; turbidity, none; sediment, none. Odor at 100 degrees F., none; chlorine in chlorides, 0.40; free ammonia, 0.0025; albuminoid ammonia, 0.0050; nitrogen as nitrites, 0.0000; nitrogen as nitrates, 0.1108; total solids, 24.40; loss on ignition, 3.80; behavior during ignition, no change; mineral matter, 20.60; remarks, satisfactory quality.

Dated at bureau of chemistry, December 21, 1903.

CONCLUSION

It is again urged that a larger appropriation be made by the legislature for carrying on the chemical work of the department. Many matters demanding investigation remain unacted upon through lack of funds with which to do the work and attention is again and particularly called to the urgent need which exists for investigating the quality of kerosene oil and other petroleum products sold for use in lamps and stoves. Through lack of any appropriation for doing this work no systematic examination of the oil supply of the state has been made in many years and the matter is one which ought no longer to be neglected.

Respectfully submitted.

WILLIS G. TUCKER
Director Bureau of Chemistry

Albany, N. Y., January 1, 1904.

SANITARY CONDITION OF THE STATE

AND

SUMMARY OF MORTALITY REPORTED DURING THE YEAR.

Sanitary Condition of the State and Summary of Mortality Reported During 1903

By F. C. Curtis M. D.

The Monthly Bulletin of Mortality for the year 1903 records a total number of deaths, 126,536, and a death rate of 16.7 per thousand population. To this should be added 578 deaths delayed in return. This is 3,000 more deaths than in 1902, which was a year of low mortality; it is 2500 more than the average of the five preceding years, but the increased population makes a death rate lower by 0.8 per cent.

There were 32,768 deaths *under the age of five years*, against 31,215 in 1902, and 36,516 the average of the five preceding years; 26.0 per cent of the deaths occurred in early life against a past average of 29.3, and a saving of 3000 lives at this age.

Epidemic diseases caused one-eighth of the deaths, 12.5 per cent, against 14.0 per cent in 1902, and as past average of 13.0 per cent. This proportion has varied in a series of years from 12.0 to 18.0 per cent.

There were 17.3 per cent of deaths at and above the *age of seventy years;* 22,050 deaths, to 32,768 under the age of five years. 3.0 deaths per 1000 population occurred over seventy, and 4.3 under five years of age.

TOTAL MORTALITY OF THE STATE, BY MONTHS

1903	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro spinal meningitis	Typhoid fever	Malaria diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough
January	11,146	17.0	2,625	23.5	2,060	85	39	153	8	20	96	40	27	73
February	10,826	18.0	2,604	23.1	1,957	83	29	151	8	3	114	55	37	74
March	11,651	17.5	2,891	25.7	2,238	68	43	151	10	2	100	70	48	109
April	10,951	17.0	2,686	24.5	2,104	84	49	105	10	6	131	66	46	86
May	10,770	16.1	2,523	23.5	1,912	100	58	99	25	3	137	108	46	85
June	9,285	14.5	2,458	26.5	1,533	135	36	74	11	2	102	104	30	71
July	11,134	16.7	3,872	34.8	1,624	223	31	136	10	......	89	88	14	72
August	10,485	16.0	3,654	35.0	1,512	220	46	141	7	......	50	49	20	83
September	9,468	14.5	2,837	30.0	1,498	171	29	170	18	......	34	16	12	51
October	9,786	15.0	2,458	25.0	1,724	123	31	194	12	......	45	27	18	31
November	10,009	16.0	2,157	21.7	1,714	100	23	165	9	3	64	48	17	37
December	11,075	17.0	2,009	18.2	2,174	90	41	137	9	2	108	50	44	40
Totals for the year	126,586	16.7	32,768	25.9	22,050	125	454	1,665	137	41	1,057	721	351	811
Average for 5 years past	124,823	17.5	36,519	29.3	21,192	130	576	1,768	267	133	931	945	348	938
Totals for 1902	123,494	17.0	31,215	25.3	20,709	140	456	1,318	139	443	1,215	929	314	938

TOTAL MORTALITY OF THE STATE, BY MONTHS—(*Concluded*)

1903	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
January	288	211	1,991	1,205	90	547	976	1,256	1,159	467	568	490	1,441
February	240	181	2,071	1,160	89	566	839	1,174	1,124	432	517	459	1,523
March	251	222	2,107	1,260	117	644	915	1,307	1,157	478	537	534	1,590
April	247	224	1,808	1,224	112	596	851	1,279	1,178	453	606	434	1,440
May	275	249	1,722	1,189	107	590	874	1,228	1,185	429	685	360	1,376
June	264	560	894	978	88	576	757	970	924	450	594	330	1,480
July	234	1,815	846	991	94	627	808	1,052	1,054	468	900	371	1,449
August	157	1,750	543	1,085	82	787	709	976	969	470	683	335	1,624
September	188	1,108	765	946	69	684	710	907	944	475	681	323	1,396
October	256	598	968	1,088	87	617	791	1,088	1,044	456	668	369	1,508
November	333	368	1,578	1,076	91	566	864	1,124	1,056	415	612	381	1,274
December	314	279	2,051	1,152	84	582	914	1,250	1,182	478	595	400	1,368
Totals for the year	3,085	7,480	17,339	13,194	1,110	7,282	9,998	13,561	12,966	5,456	7,646	4,765	17,464
Average for 5 years past	2,915	8,118	17,620	13,269	1,008	9.125	9,275	11,830	13,165	4,772	6,866	5,478	15,862
Totals for 1902	2,859	8,315	16,966	12,583	1,084	7,235	9,604	12,889	12,964	4,990	7,058	4,949	15,833

TOTALS OF MORTALITY IN THE SANITARY DISTRICTS FOR THE YEAR

1903 DISTRICTS*	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro spinal meningitis	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough
Maritime District	73,011	18.0	22,926	31.4	7,531	146	271	697	100	7	758	520	205	376
Hudson Valley District	11,619	16.7	2,175	18.7	2,752	87	34	178	19	1	86	85	30	104
Adirondack and Northern District	5,305	13.4	927	17.5	1,518	90	26	112	3	3	22	14	18	18
Mohawk Valley District	6,534	15.6	1,358	20.8	1,755	105	28	101	1	2	60	17	18	79
Southern Tier District	5,966	13.9	943	15.8	1,767	84	17	111	5	......	29	13	14	60
East Central District	5,781	14.8	878	15.2	1,870	69	12	70	1	......	14	30	10	50
West Central District	4,822	15.0	608	12.6	1,710	78	6	116	5	......	6	15	20	16
Lake Ontario and Western District	13,496	15.0	3,120	23.1	3,017	124	60	230	3	29	32	77	39	108

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* THE SANITARY DISTRICTS into which the state is divided are as follows: *Maritime District:* Includes New York, Brooklyn, Long Island, Staten Island and Westchester county. *Hudson Valley District:* All the counties on either side of the Hudson river, except Westchester, to and including Albany and Rensselaer. *Adirondack and Northern District:* The northern section of the state—the counties of Washington, Warren, Hamilton, Essex, Clinton, Franklin, St. Lawrence, Jefferson and Lewis. *Mohawk Valley District:* Schenectady, Schoharie, Saratoga, Montgomery, Fulton, Herkimer and Oneida counties. *Southern Tier District:* The seven counties along the southern border of the state—Broome, Tioga, Chemung, Steuben, Allegany, Cattaraugus, Chautauqua. *East Central District:* Sullivan, Delaware, Otsego, Madison, Chenango, Onondaga and Cortland counties. *West Central District:* Cayuga, Tompkins, Seneca, Schuyler, Ontario, Yates, Livingston, Genesee and Wyoming counties. *Lake Ontario and Western District:* Oswego, Wayne, Monroe, Orleans, Niagara and Erie counties.

TOTALS OF MORTALITY IN THE SANITARY DISTRICTS FOR THE YEAR—(*Concluded*)

1908 DISTRICTS*	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases.	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of the circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
Maritime District	2,262	5,465	11,620	8,582	688	8,113	6,255	6,445	5,775	2,828	4,405	1,025	11,614
Hudson Valley District	136	384	1,391	1,259	73	847	969	1,556	1,509	536	707	586	1,209
Adirondack and Northern District	57	204	515	495	46	446	342	676	685	239	270	480	637
Mohawk Valley District	97	280	673	570	49	497	488	775	911	276	371	408	773
Southern Tier district	75	178	569	378	58	496	387	902	784	309	385	509	692
East Central District	50	160	626	479	45	458	414	885	773	314	322	468	600
West Central District	40	128	491	355	30	379	300	727	732	276	293	420	467
Lake Ontario and Western District	318	681	1,454	1,078	126	1,046	873	1,595	1,797	678	893	809	1,472

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* **THE SANITARY DISTRICTS into which the state is divided are as follows :** ***Maritime District*: Includes New York, Brooklyn, Long Island, Staten** Island and Westchester county. *Hudson Valley District:* All the counties on either side of the Hudson river, except Westchester, to and including Albany and Rensselaer. *Adirondack and Northern District:* The northern section of the state—the counties of Washington, Warren, Hamilton, Essex, Clinton, Franklin, St. Lawrence, Jefferson and Lewis. *Mohawk Valley District:* Schenectady, Schoharie, Saratoga, Montgomery, Fulton, Herkimer and Oneida counties. *Southern Tier District:* The seven counties along the southern border of the state—Broome, Tioga, Chemung, Steuben, Allegany, Cattaraugus and Chautauqua. *East Central District:* Sullivan, Delaware, Otsego, Madison, Chenango, Onondaga and Cortland counties. *West Central District:* Cayuga, Tompkins, Seneca, Schuyler, Ontario, Yates, Livingston, Genesee and Wyoming counties. *Lake Ontario and Western District:* Oswego, Wayne, Monroe, Orleans, Niagara and Erie counties.

RELATIVE URBAN AND RURAL DEATH RATE IN THE SANITARY DISTRICTS

DISTRICTS	Area in square miles	Population per square mile	Urban death rate*	Rural death rate†	Total death rate
Maritime	2,286	1,773	18.0	17.8	17.9
Hudson Valley	5,872	118	18.4	15.0	16.5
Adirondack and Northern	15,080	26	16.5	13.4	13.5
Mohawk Valley	4,731	89	18.0	13.5	15.0
Southern Tier	6,545	66	14.5	13.5	14.0
East Central	6,555	62	14.6	14.3	14.5
West Central	4,746	66	15.0	15.0	15.0
Lake Ontario and Western	4,378	200	15.5	14.5	15.0
Entire State	50,200	157	17.8	14.0	16.5

* Namely in cities of 20,000 population and over.

† In towns and places of less than 20,000 population.

RELATIVE MORTALITY FROM CHIEF CAUSES IN SANITARY DISTRICTS

DISTRICTS	PERCENTAGE OF DEATHS—			IN EACH 1,000 DEATHS FROM ALL CAUSES THERE WERE FROM—						
	Under 5 years of age	At 70 years of age and over	From zymotic diseases	Typhoid fever	Scarlet fever	Diphtheria and croup	Diarrheal diseases	Consumption	Pneumonia	Bright's disease
Maritime	32.0	10.5	14.5	10	10	31	75	117	89.0	67.2
Hudson Valley	19.2	23.4	9.0	14	7	12	35	100	70.0	57.3
Adirondack and Northern	17.0	28.7	9.0	21	4	10	33	92	57.4	40.0
Mohawk Valley	20.7	26.6	10.0	16	11	16	35	90	63.5	53.1
Southern Tier	12.5	31.0	8.5	20	5	14	35	55	54.5	40.0
East Central	15.5	32.0	7.0	14	2	9	28	80	68.5	48.5
West Central	9.0	35.0	7.5	24	1	8	26	75	60.0	34.5
Lake Ontario and Western	23.5	22.5	12.3	21	6	22	50	80	51.0	40.5
Entire State	26.4	17.8	13.5	14	8	24	60	104	79.5	60.0

MORTALITY OF THE MONTHS

MONTHS	Total number of deaths	Deaths under five years	Percentage of deaths under five years to total deaths	Zymotic deaths per 1000 deaths from all causes	Cerebro-spinal fever	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough
January:												
1889........	8,437	2,963	35.2	170	35	89	51	15	340	164	29	105
1890........	13,020	2,227	18.2	89	29	117	62	......	93	42	30	114
1891........	9,549	2,868	30.0	132	47	138	44	1	182	140	30	92
1892........	13,460	3,246	24.1	107	58	116	38	2	294	80	51	48
1893........	10,490	3,056	29.1	137	44	120	34	15	237	86	52	94
1894........	10,948	3,088	28.2	124	53	105	30	34	146	122	45	55
1895........	10,980	3,123	28.6	100	51	108	30	3	103	84	38	78
1896........	10,176	3,064	30.0	129	49	158	22	1	118	199	31	73
1897........	9,587	2,663	27.7	104	42	106	26	......	76	70	28	58
1898........	9,632	2,416	25.0	95	34	122	26	......	123	112	21	44
1899........	12,421	2,590	21.0	65	52	111	12	1	71	51	43	77
1900........	10,552	2,788	26.5	94	29	144	17	......	75	154	43	79
1901........	12,524	2,557	20.5	84	38	192	14	10	108	59	33	56
1902........	10,968	2,933	26.8	103	48	146	16	39	141	132	42	58
1903........	11,146	2,625	23.5	85	39	152	8	20	98	40	27	73
February:												
1889........	8,193	2,933	35.8	170	32	71	30	9	324	136	30	119
1890........	9,130	2,870	27.5	118	37	94	39	......	96	50	32	92
1891........	8,704	2.813	32.5	141	41	127	32	......	203	127	58	81
1892.......	10,755	3,139	29.2	123	53	98	33	7	290	89	79	41
1893........	9,853	2,810	29.6	136	46	101	29	23	198	80	58	121
1894........	9,417	2,843	30.2	125	42	86	14	52	139	125	41	60
1895........	10,771	3,049	28.3	85	40	99	9	5	98	44	38	87
1896........	9,825	2,892	29.5	116	31	121	28	......	110	192	45	52
1897........	9,826	2,743	28.0	97	52	98	23	......	84	89	26	75
1898........	9,213	2,543	27.5	91	53	104	22	......	93	84	32	47
1899........	10,763	2,506	23.5	70	45	116	20	1	87	37	36	76
1900........	10,796	3,142	29.1	107	49	122	18	......	119	206	56	91
1901........	11,022	2,482	22.6	86	41	114	11	35	126	74	54	54
1902........	10,670	2,880	27.0	102	47	63	14	51	162	166	34	72
1903........	10,826	2,604	23.1	82	29	151	8	3	114	55	37	74
March:												
1889........	9,547	3,381	35.4	167	43	69	47	1	386	150	33	157
1890........	9,844	2,772	30.0	117	47	72	36	2	90	94	47	110
1891........	10,672	3,108	29.2	115	63	121	42	......	195	157	40	104
1892........	10,978	2,342	21.3	124	77	98	37	3	285	114	70	48
1893........	12,000	3,418	28.5	120	89	115	37	29	221	76	41	168
1894........	10,196	3,215	31.5	137	52	131	26	47	174	164	46	95
1895........	11,379	3,340	29.4	98	53	99	23	......	131	99	51	83
1896........	11,080	3.255	29.6	103	54	103	20	1	76	251	47	77
1897........	11,574	3,381	29,2	92	55	83	26	2	99	118	45	121
1898........	10,300	2,860	28.0	96	73	119	23	......	106	144	24	89
1899........	11.065	2,807	25.2	75	82	121	12	1	98	61	40	73
1900........	13,033	3,574	27.4	93	50	120	23	......	94	202	36	129
1901........	11,913	3,070	25.8	94	61	111	6	39	200	100	50	57
1902........	10,935	2,936	27.0	98	44	112	16	51	134	138	33	69
1903........	11.651	2,891	25.7	62	42	151	10	2	100	70	48	109
April:												
1889........	9,078	3,116	34.5	174	45	78	64	2	363	148	47	137
1890........	9,488	2,826	31.8	121	51	73	43	1	78	187	43	77
1891........	13,981	2,809	27.3	92	67	103	48	1	273	150	42	108
1892........	10,590	3,245	30.7	128	76	77	40	11	248	161	63	60
1893........	11,865	3,339	28.1	111	104	111	34	23	199	73	55	133
1894........	9,945	3,147	31.5	135	55	94	33	54	184	148	49	104
1895........	10,545	3,506	33.3	115	78	115	32	......	118	133	62	107
1896........	10,480	3,246	31.0	111	50	87	33	......	81	234	62	88
1897........	10,325	2,818	27.3	95	55	79	27	7	81	99	44	90
1898........	10,000	2,763	28.0	93	82	80	28	......	84	126	29	118
1899........	10,383	2,627	25.4	77	90	101	20	2	78	68	40	65
1900........	12,486	3,376	27.1	86	61	96	26	1	98	191	94	117
1901........	10,035	2,892	26.2	107	59	120	16	42	219	109	63	78
1902........	10,772	2,444	22.5	100	42	103	12	61	142	122	44	85
1903........	10,957	2,685	24.5	84	49	105	10	6	131	66	46	86

FOR FIFTEEN YEARS

Croup and diphtheria	Diarrheal diseases	Acute respiratory diseases	Consumption	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
606	101	1,473	1,061	77	421	469	577	946	194	279	507	896
534	98	3,847	1,301	95	542	553	724	1,107	277	333	658	1,969
489	108	1,761	1,310	81	533	548	737	1,041	220	288	523	1,251
659	94	3,801	1,286	125	686	541	953	1,339	295	362	1,183	1,149
613	141	2,293	1,099	136	568	607	866	1,128	260	339	515	1,243
680	87	2,479	1,140	103	618	664	812	1,164	258	361	707	1,285
547	108	2,578	1,244	81	617	622	916	1,037	290	403	506	1,586
530	127	2,015	1,152	91	614	688	934	959	302	344	464	1,305
476	112	1,742	1,051	88	592	658	964	1,005	322	437	508	1,234
323	118	1,765	1,051	91	642	739	1,013	1,032	346	400	467	1,168
255	127	2,965	1,304	76	735	818	1,116	1,336	351	400	917	1,553
352	95	2,100	1,140	121	686	838	968	1,138	332	461	460	1,270
345	196	2,770	1,326	98	629	877	1,114	1,228	440	544	648	1,304
320	188	2,274	1,068	99	645	853	1,234	1,106	384	500	448	1,260
288	211	1,991	1,205	90	547	976	1,256	1,159	467	568	490	1,441
563	75	1,477	947	100	401	461	574	922	183	256	507	996
518	82	1,950	1,304	74	477	415	556	927	209	264	515	1,899
419	121	1,683	958	107	517	522	672	1,006	205	290	504	1,007
538	99	2,315	1,196	118	620	564	813	1,218	262	340	770	1,247
480	141	1,910	954	103	602	554	779	1,102	218	279	496	1,080
527	89	1,940	1,068	87	578	550	728	1,112	227	283	499	1,175
391	107	2,526	1,161	98	600	670	917	1,085	231	351	598	1,621
444	114	2,012	1,084	100	577	690	879	993	303	393	502	1,151
370	134	1,996	1,117	72	614	628	956	1,071	251	403	490	1,176
275	119	1,738	1,031	75	673	754	763	1,123	309	337	483	1,096
236	101	2,329	1,204	64	651	765	1,045	1,200	320	412	710	1,308
352	137	2,402	1,181	107	543	873	866	1,109	396	471	463	1,285
240	200	2,292	1,180	114	614	832	1,095	1,135	371	403	603	1,486
264	180	2,241	1,100	97	558	823	1,189	1,161	375	457	412	1,174
240	181	2,071	1,160	89	566	829	1,174	1,124	422	517	459	1,523
599	115	1,840	1,195	109	468	488	662	1,004	228	237	624	1,092
514	94	1,929	1,238	99	511	471	709	1,051	235	314	520	1,661
413	101	2,307	1,318	112	613	611	771	1,165	233	290	696	1,270
531	108	2,390	1,272	137	638	583	803	1,305	276	328	690	1,192
517	163	2,951	1,286	131	699	695	885	1,330	303	334	589	1,343
546	124	1,814	1,190	110	638	683	760	1,196	262	346	476	1,366
445	137	2,395	1,274	104	691	721	971	1,160	312	417	714	1,499
370	142	2,310	1,490	121	695	744	1,031	1,180	316	414	586	1,052
377	146	2,485	1,190	117	672	737	1,136	1,206	375	441	615	1,531
281	123	1,872	1,166	89	718	810	901	1,251	382	430	511	1,186
220	126	2,145	1,284	81	726	838	1,052	1,290	418	419	588	1,390
342	167	3,137	1,363	160	689	982	1,132	1,301	443	437	591	1,585
277	215	2,522	1,293	122	644	884	1,116	1,324	409	409	532	1,542
247	227	1,951	1,235	120	606	911	1,167	1,176	406	487	442	1,366
251	222	2,107	1,260	117	644	915	1,307	1,157	478	537	534	1,590
380	122	1,656	1,092	125	429	478	574	966	222	311	590	1,029
436	97	1,781	1,188	75	599	484	691	1,046	220	330	460	1,578
370	122	4,857	1,377	92	596	645	869	1,348	271	418	901	1,816
491	131	2,161	1,252	126	665	576	822	1,291	240	400	466	1,238
444	143	2,943	1,329	124	678	637	865	1,413	304	403	572	1,279
511	117	1,718	1,091	85	688	604	741	1,102	298	449	501	1,319
424	151	2,135	1,220	83	666	653	917	1,017	282	483	494	1,425
345	187	2,124	1,189	98	635	641	919	1,080	320	480	471	1,356
360	137	1,893	1,158	105	646	742	979	1,167	325	455	517	1,359
252	137	1,869	1,100	91	671	782	884	1,218	333	436	481	1,200
197	136	1,895	1,187	93	760	820	997	1,206	346	430	532	1,318
277	117	2,962	1,302	125	852	860	1,080	1,270	410	469	578	1,509
273	200	1,899	1,293	101	613	867	1,058	1,268	428	481	447	1,404
268	231	1,716	1,154	103	644	872	1,188	1,241	439	515	414	1,371
247	224	1,808	1,224	112	596	851	1,279	1,178	458	606	434	1,440

MORTALITY OF THE MONTHS

MONTHS	Total number of deaths	Deaths under five years	Percentage of deaths under five years to total deaths	Zymotic deaths per 1000 deaths from all causes	Cerebro-spinal fever	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough
May:												
1889........	8,357	2,773	33.1	155	42	63	37	......	276	108	40	121
1890........	9,194	2,740	31.6	130	62	72	55	......	60	200	34	68
1891........	10,213	2,917	28.6	117	57	88	85	......	252	184	37	79
1892........	10,223	3,289	32.3	139	69	71	50	13	245	254	56	69
1893........	10,718	3,080	28.7	128	159	93	40	21	193	92	43	127
1894........	9,286	2,862	30.8	139	53	85	29	37	140	97	36	97
1895........	9,452	2,888	30.5	116	46	92	38	1	83	183	36	71
1896........	9,541	2,842	30.0	119	51	59	38	1	78	172	40	100
1897........	9,266	2,469	27.0	103	51	65	44	7	98	119	35	62
1898........	9,748	2,690	27.0	93	81	86	27	......	113	109	30	112
1899........	9,556	2,366	25.0	78	71	93	14	5	76	85	45	37
1900........	10,938	3,160	29.0	93	51	102	28	1	71	161	52	111
1901........	10,827	2,620	25.4	112	43	96	15	67	226	95	44	69
1902........	10,616	2,778	26.2	105	46	99	20	52	175	104	33	83
1903........	10,770	2,523	23.5	100	58	99	25	3	127	108	46	85
June:												
1889........	8,370	3,632	43.4	241	27	45	59	......	154	64	20	120
1890........	9,185	3,515	40.2	217	28	69	63	1	68	161	29	90
1891........	9,321	3,615	38.8	186	42	80	46	......	207	133	41	65
1892........	9,075	3,437	37.7	188	57	75	62	10	183	255	37	50
1893........	8,728	2,885	33.0	162	96	83	42	10	154	99	24	77
1894........	9,805	3,588	36.6	182	32	72	43	24	121	90	15	79
1895........	8,736	3,114	35.6	175	40	81	35	......	71	217	28	95
1896	9,342	3,466	37.0	183	44	66	37	......	50	140	22	85
1897........	9,028	2,865	31.5	140	51	66	31	7	82	86	31	64
1898........	8,637	2,558	30.0	122	109	70	22	......	82	99	17	111
1899........	9,433	3,104	33.0	145	62	80	22	7	71	102	31	73
1900........	9,444	3,101	33.0	120	39	65	26	1	44	120	40	71
1901........	9,500	2,500	26.3	133	42	83	27	74	165	95	27	54
1902........	9,449	2,790	29.5	150	36	99	16	70	111	100	28	86
1903........	9,285	2,453	26.5	135	36	74	11	2	102	104	30	71
July:												
1889........	10,806	5,563	51.4	252	46	117	61	1	69	33	14	112
1890........	11,606	5,602	50.5	327	56	101	56	......	45	91	12	133
1891........	11,370	5,782	50.8	329	57	97	44	......	181	93	19	48
1892........	13,555	6,855	52.1	340	59	131	61	8	75	150	20	136
1893........	12,332	6,231	50.5	324	86	87	45	16	69	75	13	92
1894........	12,516	6,260	50.0	335	50	93	44	19	76	55	14	121
1895........	11,681	5,841	50.0	326	49	108	26	......	32	130	20	143
1896........	12,659	6,192	49.0	305	64	103	50	......	55	85	12	117
1897........	11,235	5,089	45.5	272	54	87	36	4	69	76	16	66
1898........	11,441	4,945	43.0	255	68	89	24	......	59	52	13	176
1899........	11,291	4,819	42.6	239	56	94	34	1	45	82	21	101
1900........	11,641	4,728	40.6	235	53	101	17	1	43	92	22	113
1901........	12,248	4,344	35.5	236	51	99	24	89	105	78	17	71
1902........	10,938	4,132	38.5	250	54	107	21	34	76	57	23	115
1903........	11,134	3,872	34.8	223	81	126	10	......	89	88	14	72
August:												
1889........	9,873	4,059	40.7	280	33	224	96	......	54	22	10	133
1890........	10,642	4,480	48.8	292	49	167	86	......	35	69	11	153
1891........	10,720	4,829	45.0	297	38	171	67	......	120	41	14	64
1892........	10,903	4,933	45.2	292	54	182	56	18	61	51	19	138
1893........	11,037	4,954	45.0	298	55	157	62	11	63	44	14	129
1894........	10,890	4,664	44.8	283	44	183	41	6	48	19	17	129
1895........	11,050	4,962	45.0	282	46	156	39	......	26	76	17	156
1896........	12,475	4,789	38.4	246	43	171	48	......	19	59	20	132
1897........	10,084	4,021	40.0	240	38	124	41	......	19	40	23	84
1898........	11,302	4,811	42.5	255	40	181	49	......	26	26	16	168
1899........	10,003	3,696	37.0	216	64	157	23	......	26	49	15	120
1900........	11,047	4,223	38.3	237	47	174	37	2	22	49	11	86
1901........	10,999	4,339	40.0	285	43	168	36	40	49	40	9	80
1902........	10,632	4,024	38.0	250	40	165	21	10	39	28	14	110
1903........	10,435	3,654	35.0	220	46	141	7	......	50	49	20	82

FOR FIFTEEN YEARS—(*Continued*)

Croup and diphtheria	Diarrheal diseases	Acute respiratory diseases	Consumption	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
492	123	1,172	1,102	86	511	421	599	951	227	377	548	1,061
420	142	1,538	1,077	95	539	508	691	999	273	371	436	1,554
339	127	2,129	1,234	114	561	555	741	1,021	248	434	629	1,849
480	118	1,972	1,207	108	617	610	776	1,159	270	461	443	1,180
439	175	1,944	1,239	86	660	664	834	1,287	286	544	508	1,284
585	136	1,333	1,093	93	644	577	745	1,056	265	487	427	1,271
390	157	1,459	1,149	83	628	669	903	1,022	270	503	413	1,250
292	205	1,474	1,193	93	647	644	852	1,066	326	555	400	1,155
368	113	1,357	1,054	80	637	716	935	1,001	336	478	449	1,211
223	127	1,576	1,127	84	695	757	915	1,171	375	478	469	1,193
203	122	1,389	1,169	92	716	763	912	1,117	359	555	484	1,249
290	157	1,899	1,234	96	786	797	983	1,200	392	581	492	1,405
263	236	1,406	1,224	92	649	769	1,114	1,195	434	590	415	1,285
243	259	1,673	1,135	86	586	885	1,179	1,098	501	633	388	1,139
275	249	1,722	1,139	107	590	874	1,228	1,185	429	685	360	1,376
423	1,112	744	919	77	639	386	485	951	222	376	414	1,133
364	1,087	972	984	83	679	497	541	1,000	237	452	347	1,433
319	808	1,098	978	103	720	479	678	1,127	224	534	353	1,286
309	676	1,060	1,005	89	692	449	693	1,132	248	545	368	1,080
359	478	1,010	1,065	67	612	503	679	1,108	241	564	384	1,073
575	739	1,037	982	84	723	583	718	1,180	307	628	419	1,354
338	627	825	974	63	665	592	718	927	275	620	357	1,188
362	915	877	1,097	69	793	625	782	947	290	551	385	1,205
354	503	945	1,002	83	784	643	864	1,037	325	530	362	1,178
174	372	857	1,007	96	783	656	780	1,031	367	581	361	1,062
236	686	883	1,028	76	869	709	746	1,087	406	661	409	1,192
243	477	1,058	1,070	90	874	705	807	1,057	397	637	358	1,265
246	450	965	1,111	97	596	751	957	981	418	723	379	1,259
228	636	944	980	74	570	758	1,041	949	411	646	338	1,328
264	560	894	978	88	576	757	970	924	450	594	320	1,480
305	3,092	537	1,012	63	844	449	542	1,029	227	357	502	1,394
293	2,916	706	1,073	60	1,024	497	543	1,092	242	553	395	1,718
304	2,908	717	1,032	87	1,036	502	652	1,158	239	458	363	1,397
340	3,629	861	1,093	96	1,264	556	700	1,348	266	842	417	1,503
379	3,206	746	1,073	72	1,219	552	726	1,252	300	598	383	1,333
470	3,258	688	1,094	64	1,184	527	638	1,282	296	683	392	1,468
323	2,974	627	1,040	83	1,135	599	732	1,000	322	549	364	1,425
293	3,086	785	1,050	72	1,267	661	842	1,169	349	649	409	1,541
258	2,396	693	941	92	1,114	569	804	1,090	323	750	416	1,381
159	2,298	710	1,116	67	1,244	646	793	1,118	380	762	388	1,279
193	2,068	748	1,076	70	1,428	755	690	981	396	645	402	1,405
208	2,082	726	1,102	75	1,446	727	798	1,016	431	857	377	1,354
125	2,231	602	1,062	78	609	776	821	1,175	434	2,020	409	1,372
180	2,038	752	1,038	86	632	741	953	1,000	434	745	375	1,467
234	1,815	846	991	94	627	808	1,052	1,054	463	900	371	1,449
327	1,901	591	1,026	63	680	437	540	936	254	373	477	1,196
233	2,192	666	1,064	70	871	442	537	1,125	236	512	375	1,749
266	2,405	675	1,041	87	925	480	612	1,133	257	617	477	1,235
275	2,828	704	1,056	78	985	512	662	1,208	279	572	369	1,801
328	2,406	663	1,040	73	986	534	676	1,167	283	600	432	1,814
383	2,068	621	1,031	71	945	573	626	1,011	395	543	405	1,831
305	2,806	668	1,051	67	1,027	523	741	1,034	357	597	457	1,404
257	2,826	636	1,059	69	1,062	644	802	1,113	294	1,695	508	1,518
249	1,799	597	1,027	92	1,023	617	808	879	387	600	387	1,265
124	2,345	618	1,019	67	1,288	651	749	1,062	390	709	430	1,849
171	1,535	599	1,034	75	1,091	679	736	955	394	576	433	1,271
198	1,965	577	1,047	84	1,244	681	773	995	436	777	379	1,443
142	2,555	509	1,078	81	693	629	831	993	411	683	361	1,568
161	2,069	664	984	80	608	728	865	994	443	733	365	1,491
157	1,750	543	1,025	82	737	709	976	959	470	683	325	1,624

MORTALITY OF THE MONTHS

MONTHS	Total number of deaths	Deaths under five years	Percentage of deaths under five years to total deaths	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal fever	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough
September:												
1889	8,264	3,179	38.4	208	19	247	98	2	53	9	14	90
1890	9,111	3,356	39.0	224	30	234	84	......	40	29	15	102
1891	9,662	3,984	41.2	247	59	287	83	......	99	21	13	60
1892	9,695	3,760	38.8	235	48	282	74	9	78	37	16	94
1893	9,346	3,718	39.8	248	49	227	63	23	34	24	11	85
1894	9,525	3,948	41.5	244	28	229	51	9	33	15	11	102
1895	10,011	4,161	41.5	250	52	220	50	......	26	36	15	119
1896	9,467	3,396	36.0	197	44	221	65	......	26	31	11	102
1897	9,588	3,432	35.5	188	51	157	34	......	31	19	12	76
1898	11,481	4,320	37.5	230	47	333	82	......	23	20	6	120
1899	9,186	3,068	33.4	172	57	205	21	......	19	34	6	85
1900	10,251	3,760	36.7	220	41	245	41	......	12	21	16	66
1901	10,269	3,668	35.7	283	25	210	47	11	32	14	14	60
1902	9,682	3,218	32.6	195	30	179	20	6	31	7	15	83
1903	9,468	2,838	30.0	171	29	170	18	......	34	16	12	51
October:												
1889	8,050	2,288	28.4	177	21	261	87	......	57	7	18	70
1890	8,640	2,665	32.7	155	26	240	87	......	62	47	6	84
1891	9,718	3,454	35.5	200	47	290	70	......	118	36	14	54
1892	9,092	2,894	31.8	174	35	205	72	27	96	26	18	78
1893	8,981	2,994	33.4	185	56	253	50	19	65	14	16	56
1894	9,006	2,936	32.5	180	22	234	46	5	32	15	6	73
1895	9,320	2,951	31.5	167	36	265	50	2	36	46	13	95
1896	8,676	2,451	28.2	130	27	195	57	......	35	37	12	67
1897	9,080	2,055	22.6	135	30	173	44	......	49	33	15	59
1898	9,632	2,868	30.0	140	37	281	49	......	38	10	14	59
1899	9,280	3,175	34.2	110	46	202	27	1	36	24	17	60
1900	9,676	3,864	29.6	146	36	283	37	......	24	24	13	54
1901	9,738	2,627	27.0	150	25	235	40	14	38	20	17	53
1902	9,475	2,537	27.0	132	34	225	18	4	56	17	6	61
1903	9,786	2,458	25.0	123	31	194	12	......	45	27	13	31
November:												
1889	7,285	2,025	27.7	139	21	169	63	......	56	25	21	55
1890	8,209	2,199	28.5	146	29	216	68	......	102	74	17	62
1891	8,727	2,528	29.0	151	39	241	61	2	179	81	26	31
1892	8,448	2,540	30.1	167	39	184	50	18	127	51	26	77
1893	8,458	2,324	27.5	157	45	180	30	27	77	56	14	50
1894	8.159	2,254	27.6	151	25	189	30	10	52	15	17	53
1895	8,372	2,287	27.4	134	24	204	43	......	51	96	13	57
1896	7,888	2,165	37.5	113	25	132	21	......	48	45	18	44
1897	8,325	2,045	24.5	108	31	151	28	......	62	63	12	27
1898	8.709	1,970	22.7	90	36	189	30	1	32	18	17	52
1899	8,607	2,187	25.4	101	38	169	25	......	54	75	26	47
1900	8,715	2,178	25.0	110	38	233	26	1	33	32	12	50
1901	9,309	2,097	22.6	110	26	147	23	9	81	49	6	39
1902	9,010	2,086	23.2	100	15	208	10	20	63	19	10	44
1903	10,009	2,157	21.7	100	23	165	9	8	64	48	17	37
December:												
1889	8,483	2,311	27.0	126	38	117	53	......	73	33	22	84
1890	8,761	2,635	30.0	135	30	157	59	......	144	117	36	71
1891	11,241	3,023	26.9	133	32	183	47	......	246	78	33	41
1892	9,528	2,754	28.9	146	24	147	46	17	195	82	22	72
1893	10,600	2,834	26.7	117	46	158	27	35	106	70	25	73
1894	9,000	2,567	28.5	133	33	139	35	11	82	35	34	55
1895	9,438	2,772	29.5	134	31	169	34	......	75	172	34	72
1896	9,074	2,378	26.0	112	28	126	30	......	63	50	20	59
1897	9,180	2,195	25.0	97	28	160	20	......	91	61	26	43
1898	10,877	2,269	21.0	70	35	156	22	......	53	38	18	59
1899	9,833	2,441	25.0	98	39	155	18	2	69	88	33	72
1900	9,889	2,310	23.3	105	37	263	16	7	60	81	21	53
1901	10,378	2,579	24.8	104	38	166	24	15	81	126	30	52
1902	10,347	2,447	23.6	97	20	182	5	44	85	39	33	57
1903	11,075	2,009	18.2	90	41	187	9	2	103	50	44	40

FOR FIFTEEN YEARS—(*Concluded*)

Croup and diphtheria	Diarrheal diseases	Acute respiratory diseases	Consumption	Puerperal diseases	Diseases of digestive system (not diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
343	1,094	646	949	65	638	794	483	870	206	326	446	872
247	1,196	710	1,027	47	768	418	520	871	236	375	450	1,712
334	1,434	720	1,039	65	924	479	596	997	289	449	421	1,293
374	1,266	854	1,023	69	887	502	644	1,008	280	469	461	1,208
411	1,395	713	912	68	863	528	597	1,026	268	448	391	1,221
389	1,454	668	988	54	852	492	612	970	268	488	399	1,413
322	1,672	675	1,009	65	923	577	703	988	277	522	452	1,308
294	1,077	826	1,023	57	848	556	810	905	306	543	417	1,805
259	1,171	785	998	70	949	602	825	933	327	651	421	1,217
135	1,372	768	1,076	70	1,162	647	856	1,116	378	927	478	1,362
183	972	755	947	50	1,065	646	729	937	366	537	327	1,245
154	1,656	645	980	72	1,143	727	705	905	405	605	420	1,392
183	1,808	582	1,021	58	673	705	815	958	417	577	402	1,657
166	1,390	835	917	80	622	686	899	995	314	589	512	1,806
186	1,103	765	946	69	634	710	907	944	475	681	322	1,896
570	339	959	1,016	64	557	431	595	899	238	343	491	1,062
382	360	1,001	1,061	71	635	465	597	884	238	366	470	1,538
527	794	1,012	1,124	60	832	558	695	1,023	259	430	494	1,281
551	491	1,132	996	62	709	547	694	1,024	263	448	420	1,198
599	533	947	1,070	58	771	542	658	1,010	273	422	363	1,206
551	635	901	1,013	54	757	540	690	959	298	452	477	1,249
458	554	749	1,112	67	761	630	767	840	319	511	445	1,564
361	338	1,123	990	70	689	605	908	815	323	455	437	1,132
370	444	1,090	1,070	79	717	608	820	911	358	568	437	1,205
180	687	1,044	1,052	65	943	673	848	1,015	376	526	443	1,292
254	361	1,168	1,064	57	832	753	810	1,017	394	550	417	1,195
228	712	967	1,078	62	955	760	830	934	376	540	429	1,334
260	733	916	1,112	59	659	792	923	991	424	527	425	1,475
215	613	985	1,027	61	610	777	1,040	1,039	416	571	406	1,294
256	598	968	1,038	87	617	791	1,038	1,044	456	668	369	1,503
501	110	1,133	944	67	450	452	599	822	199	311	419	868
467	124	1,207	1,019	74	518	435	554	851	208	387	409	1,388
567	143	1,507	1,017	65	583	501	656	967	237	404	437	1,063
697	137	1,445	940	55	582	490	674	845	244	377	382	1,008
700	152	1,242	957	57	595	429	691	925	242	411	469	1,009
703	146	1,131	1,022	48	567	575	662	888	262	383	394	991
483	150	1,348	979	71	583	584	750	798	263	473	370	1,027
429	132	1,184	876	66	524	599	828	772	330	443	355	1,017
339	191	1,153	977	78	605	667	867	841	308	432	418	1,075
242	165	1,288	1,049	54	625	681	918	998	380	456	451	1,027
307	132	1,274	1,027	61	642	729	832	916	370	457	412	1,014
304	231	1,172	1,011	66	694	758	764	955	390	412	401	1,132
331	300	1,206	1,063	74	537	841	1,002	1,000	410	478	364	1,326
248	254	1,327	951	61	541	689	997	1,043	419	625	374	1,092
323	288	1,573	1,076	91	566	864	1,124	1,056	415	612	381	1.274
546	110	1,635	1,127	83	463	466	656	950	238	288	455	1,046
497	80	1,756	1,045	85	533	488	643	1,000	257	285	454	1,029
725	115	2,731	1,090	100	646	593	801	1,183	296	416	732	1,153
673	113	1,737	1,145	78	575	572	779	1,132	259	404	416	1,036
678	123	2,445	1,099	80	581	610	792	1,078	254	359	724	1,237
672	108	1,555	1,117	58	551	628	719	1,033	269	384	401	1,088
563	115	1,740	1,054	79	596	609	931	866	306	510	399	1,083
520	127	1,454	1,062	66	601	673	899	927	330	495	443	1,098
335	122	1,540	1,056	61	610	679	952	981	344	427	501	1,118
244	141	2,250	1,185	71	657	845	1,091	1,177	369	479	562	1,425
331	112	1,793	1,088	82	648	789	941	1,085	416	451	437	1,184
358	143	1.587	1,062	78	733	793	970	1,113	413	467	454	1,160
341	213	1,923	1,050	94	562	835	1,103	1,123	442	491	454	1,210
319	210	1,624	1,023	82	613	881	1,137	1,165	458	557	465	1,348
314	279	2,051	1,152	84	582	914	1,250	1,182	478	595	400	1,368

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—MARITIME DISTRICT

YEAR	All deaths	Death rate	Deaths under five years of age	Deaths at 70 years and over	Epidemic Diseases									
					Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Diphtheria	Diarrhea
1885	55,021	......	22,436	......	233	488	718	28	989	948	230	694	3,207	5,828
1886	57,420	......	24,668	......	246	483	687	37	790	790	223	880	4,103	5,243
1887	61,715	......	25,289	......	232	528	656	171	933	988	217	283	4,654	6,501
1888	64,421	......	27,513	......	201	558	519	153	2,012	670	240	820	4,378	5,900
1889	65,037	......	27,691	......	243	638	468	......	1,661	700	209	993	4,098	5,596
1890	67,512	......	28,781	......	170	625	444	2	562	972	216	681	3,314	5,576
1891	74,681	......	30,620	......	311	658	381	1	1,858	940	243	678	3,466	6,146
1892	74,590	......	30,905	......	364	634	412	142	1,499	1,093	278	640	3,578	6,422
1893	75,027	......	29,561	......	652	657	337	252	939	538	227	905	3,837	5,998
1894	71,055	......	29,826	......	254	561	300	281	784	839	206	594	5,066	5,647
1895	74,246	21.2	30,303	......	335	566	281	11	626	1,023	238	858	3,830	5,992
1896	75,789	21.5	29,122	......	291	594	333	3	566	1,106	200	722	3,403	5,418
1897	67,646	18.9	26,804	......	332	535	285	27	726	621	192	506	2,881	4,744
1898	71,196	20.0	26,908	......	401	724	296	1	727	529	150	801	1,786	5,285
1899	70,384	18.4	25,751	......	414	578	185	18	550	600	241	565	2,006	3,905
1900	75,989	19.5	27,625	......	310	760	240	11	479	863	326	616	2,393	4,293
1901	76,030	20.0	25,649	7,818	257	775	222	426	1,178	469	208	334	2,147	7,114
1902	78,335	18.6	25,494	7,310	264	809	188	322	968	787	193	661	2,111	6,187
1903	78,011	18.0	22,926	7,581	271	697	100	7	758	530	205	376	2,262	5,465

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—MARITIME DISTRICT—(*Concluded*)

YEAR	OTHER CAUSES OF DEATH										
	Consumption	Acute respiratory diseases	Puerperal	Digestive	Urinary	Circulatory	Nervous	Cancer	Violence	Old age	Unclassified
1885	7,896	8,086	648	2,813	3,095	2,863	5,252	1,087	1,989	2,909	5,056
1886	8,069	8,269	557	3,084	3,241	2,941	5,829	1,171	2,094	3,076	6,138
1887	7,546	8,517	560	3,457	3,490	3,197	6,102	1,817	2,289	3,437	6,652
1888	7,996	9,654	650	3,643	3,589	3,486	6,729	1,849	2,126	2,177	7,646
1889	8,014	9,619	599	3,866	491	3,653	6,665	1,858	2,157	1,491	8,897
1890	8,621	7,504	586	4,379	3,886	3,872	6,691	1,543	2,507	1,518	10,468
1891	8,378	13,638	666	4,787	4,334	4,368	7,123	1,522	2,900	1,569	10,791
1892	8,250	12,771	716	5,105	4,260	4,469	7,463	1,609	3,225	1,620	10,043
1893	8,359	13,472	600	5,099	4,583	4,609	7,558	1,614	3,030	1,543	10,218
1894	7,796	10,414	521	5,266	4,416	4,189	6,851	1,655	3,282	1,442	10,701
1895	8,319	11,633	513	5,463	4,755	5,413	5,580	1,805	3,784	1,371	11,764
1896	8,314	11,328	591	5,374	4,920	5,586	5,570	1,894	4,684	1,459	10,522
1897	7,204	9,768	536	5,221	4,938	5,455	5,435	2,031	3,672	1,322	10,813
1898	8,191	10,677	533	6,314	5,368	5,020	6,370	2,174	3,901	1,417	10,296
1899	8,546	11,264	529	6,309	5,818	4,788	6,255	2,802	3,639	1,594	10,281
1900	8,650	13,240	744	6,804	6,115	4,981	6,049	2,449	4,150	1,456	11,112
1901	8,730	11,010	656	3,270	6,171	5,888	6,241	2,651	4,996	1,455	11,832
1902	8,080	11,798	662	3,242	6,141	6,438	5,970	2,557	4,074	1,407	10,666
1903	8,582	11,620	688	3,113	6,255	6,445	5,775	2,828	4,405	1,025	11,614

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—HUDSON VALLEY DISTRICT

YEAR	All deaths	Death rate	Deaths under five years of age.	Deaths at 70 years and over	EPIDEMIC DISEASES									
					Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Diphtheria	Diarrhea
1885	8,941	......	2,688	......	86	249	95	8	63	109	25	48	580	560
1886	9,639	......	2,991	......	145	263	64	1	70	70	32	141	597	612
1887	9,895	......	2,864	......	135	270	79	4	109	49	25	41	579	706
1888	11,015	......	3,248	......	93	355	80	7	231	48	23	85	708	740
1889	11,106	......	3,222	......	58	257	96	......	324	108	18	68	722	681
1890	10,893	......	2,713	......	67	222	87	1	48	6	26	159	363	448
1891	12,209	......	3,093	......	71	372	85	......	94	84	24	102	378	720
1892	13,147	......	5,411	......	79	248	60	......	299	113	50	46	741	783
1893	12,174	......	3,074	......	70	288	65	......	213	41	27	86	507	690
1894	11,733	......	2,966	......	69	264	54	20	161	28	19	142	367	741
1895	12,148	18.7	3,217	......	70	402	49	......	84	96	34	110	340	767
1896	12,316	19.0	2,975	......	52	314	50	......	81	125	45	68	329	891
1897	11,822	17.7	2,625	......	52	247	36	......	11	32	23	50	327	610
1898	11,776	17.6	2,574	......	92	332	49	......	25	17	19	105	212	714
1899	11,854	17.0	2,499	......	84	318	31	1	26	53	30	75	231	625
1900	12,432	17.4	2,870	......	55	350	27	......	41	184	36	120	259	843
1901	11,986	17.5	2,309	2,744	43	238	32	6	79	56	25	49	234	471
1902	11,070	16.0	2,150	2,583	35	251	25	14	50	20	14	88	175	467
1903	11,619	16.7	2,175	2,752	34	178	19	1	86	35	30	104	136	384

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—HUDSON VALLEY DISTRICT—(*Concluded*)

YEAR	OTHER CAUSES OF DEATH										
	Consumption	Acute respiratory diseases	Puerperal	Digestive	Urinary	Circulatory	Nervous	Cancer	Violence	Old age	Unclassified
1885	1,295	1,059	99	496	370	717	1,216	238	333	523	767
1886	1,330	1,167	99	706	370	844	964	232	386	722	798
1887	1,331	946	107	642	396	957	955	233	413	1,187	801
1888	1,258	1,230	85	674	415	900	1,152	264	412	1,417	965
1889	1,454	1,310	83	725	453	1,043	1,184	291	425	1,090	815
1890	1,329	747	74	818	528	1,002	1,401	292	411	841	838
1891	1,343	2,053	81	912	545	1,045	1,589	300	505	990	957
1892	1,369	2,107	104	867	587	1,069	1,687	330	561	894	1,093
1893	1,244	1,827	114	872	600	1,117	1,577	356	536	858	1,091
1894	1,305	1,570	90	816	731	997	1,512	332	542	796	1,180
1895	1,298	1,696	79	823	711	1,086	1,634	356	476	805	1,184
1896	1,414	1,574	52	876	715	1,119	1,649	404	577	768	1,126
1897	1,316	1,755	78	863	788	1,241	1,632	425	521	765	1,056
1898	1,253	1,492	82	827	772	1,254	1,719	419	578	785	1,025
1899	1,318	1,541	62	822	756	1,261	1,646	415	532	765	1,237
1900	1,373	1,606	75	857	781	1,276	1,668	476	581	731	1,193
1901	1,342	1,519	87	968	774	1,324	1,657	456	657	720	1,186
1902	1,180	1,279	61	837	811	1,458	1,493	497	629	591	1,092
1903	1,259	1,391	73	847	939	1,556	1,509	536	707	536	1,209

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—ADIRONDACK AND NORTHERN DISTRICT

YEAR	All deaths	Death rate	Deaths under five years of age	Deaths at 70 years and over	EPIDEMIC DISEASES									
					Cerebro-spinal meningitis	Typhoid fever	Malaria diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Diphtheria	Diarrhea
1885	2,428	....	626	....	20	47	12	1	19	11	11	28	175	113
1886	2,479	....	616	....	25	51	5	....	19	18	9	40	110	144
1887	2,969	....	710	....	36	71	11	....	28	16	19	20	147	169
1888	3,485	....	823	....	36	63	10	3	39	30	8	8	160	208
1889	3,129	....	786	....	13	73	15	....	9	16	6	34	106	194
1890	3,825	....	795	....	19	51	12	....	12	25	10	32	145	166
1891	4,131	....	888	....	23	81	18	....	23	10	12	12	141	266
1892	4,534	....	924	....	34	89	13	....	23	50	15	23	133	206
1893	4,367	....	881	....	13	89	9	....	43	14	11	41	177	186
1894	4,435	....	890	....	29	100	4	....	25	6	18	31	123	255
1895	4,268	13.0	904	....	18	108	4	....	29	2	9	22	79	226
1896	4,447	13.0	862	....	29	77	....	....	24	41	15	16	121	237
1897	5,257	14.5	1,011	....	23	96	6	....	6	27	11	28	132	240
1898	5,187	14.7	964	....	27	123	5	....	3	30	9	43	59	307
1899	5,332	14.0	994	....	37	139	4	....	19	2	10	44	54	270
1900	5,430	14.2	1,068	....	36	152	5	....	23	48	25	24	74	393
1901	5,611	14.0	1,155	1,538	31	97	3	4	35	33	22	36	93	229
1902	4,981	13.0	967	1,454	30	99	5	9	28	25	14	24	46	167
1903	5,305	13.4	987	1,518	26	112	3	2	22	14	18	18	57	204

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—ADIRONDACK AND NORTHERN DISTRICT—(*Concluded*)

YEAR	OTHER CAUSES OF DEATH										
	Consumption	Acute respiratory diseases	Puerperal	Digestive	Urinary	Circulatory	Nervous	Cancer	Violence	Old age	Unclassified
1885	359	268	38	149	84	209	258	66	89	217	269
1886	342	220	51	177	93	193	262	92	92	323	212
1887	366	236	32	169	79	182	253	112	106	626	268
1888	381	371	48	226	78	221	317	94	102	743	290
1889	381	330	32	216	117	237	364	110	114	484	289
1890	415	554	38	298	130	287	370	115	132	454	370
1891	460	478	37	323	171	388	433	128	177	556	368
1892	482	603	38	356	174	439	518	133	178	567	458
1893	459	561	44	340	197	402	508	157	163	523	430
1894	510	504	47	326	225	435	514	145	165	501	472
1895	488	459	55	323	195	445	532	173	179	480	437
1896	520	453	35	338	248	472	561	192	215	432	426
1897	571	672	50	377	321	594	627	218	241	539	463
1898	581	551	55	436	304	567	678	212	239	502	462
1899	525	663	39	404	319	552	669	212	207	586	549
1900	539	616	46	399	318	578	678	234	231	470	546
1901	564	703	45	441	322	627	708	206	249	483	628
1902	521	459	42	399	311	591	681	229	262	469	570
1903	493	515	46	446	342	676	685	239	270	480	637

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—MOHAWK VALLEY DISTRICT

YEAR	All deaths	Death rate	Deaths under five years of age	Deaths at 70 years and over	EPIDEMIC DISEASES									
					Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Diphtheria	Diarrhea
1885	3,174	......	647	......	32	62	19	......	19	36	20	12	142	183
1886	3,559	......	946	......	54	78	22	......	38	......	13	29	131	192
1887	4,359	......	1,089	......	33	89	14	......	32	25	8	21	294	321
1888	4,594	......	1,106	......	19	101	19	......	18	22	9	20	301	283
1889	4,643	......	1,152	......	32	99	17	1	30	26	11	28	249	305
1890	5,178	......	1,151	......	32	159	32	......	41	21	9	20	273	292
1891	5,978	......	1,310	......	25	166	23	......	62	26	18	30	188	315
1892	6,356	......	1,278	......	28	173	23	......	90	33	17	30	290	264
1893	5,497	......	1,231	......	19	118	16	......	67	22	16	25	209	293
1894	5,375	......	1,286	......	19	112	13	1	64	1	16	38	151	350
1895	5,858	15.8	1,133	......	24	106	7	......	25	1	16	36	60	297
1896	5,714	16.4	1,300	......	35	135	6	......	23	109	22	49	86	388
1897	5,611	16.0	1,025	......	20	96	5	......	18	25	11	21	109	244
1898	5,883	15.5	1,185	......	40	128	8	......	10	24	12	30	89	382
1899	6,087	15.5	1,060	......	32	90	3	1	13	3	12	52	114	256
1900	6,164	15.5	1,875	......	26	139	5	2	18	67	15	50	132	405
1901	6,455	16.0	1,195	1,737	28	110	4	4	25	49	25	37	142	264
1902	6,089	15.0	1,252	1,609	26	84	1	2	77	16	11	10	121	264
1903	6,534	15.1	1,358	1,755	28	101	1	2	60	17	18	79	97	280

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—MOHAWK VALLEY DISTRICT—(*Concluded*)

YEAR	OTHER CAUSES OF DEATH										
	Consumption	Acute respiratory diseases	Puerperal	Digestive	Urinary	Circulatory	Nervous	Cancer	Violence	Old age	Unclassified
1885	456	366	41	185	111	263	452	99	115	293	268
1886	471	359	30	286	146	266	426	115	143	460	300
1887	485	364	33	274	156	319	474	165	178	712	367
1888	530	469	43	265	167	330	473	166	212	768	385
1889	527	477	30	303	189	436	549	180	187	631	412
1890	582	693	41	403	228	414	694	154	209	491	400
1891	646	813	44	445	297	524	771	194	230	694	438
1892	661	909	50	443	294	575	850	209	257	699	458
1893	564	702	40	408	323	523	728	200	237	527	465
1894	602	596	34	430	303	462	729	176	254	500	525
1895	608	607	45	389	360	529	715	207	228	536	557
1896	596	655	42	422	340	551	720	189	273	502	574
1897	533	759	62	432	359	570	789	243	277	541	508
1898	606	591	43	427	408	617	828	264	305	482	541
1899	549	807	45	468	431	691	802	255	284	555	824
1900	569	713	46	479	386	625	796	295	331	453	620
1901	608	887	48	512	438	677	826	267	340	473	689
1902	517	631	38	506	426	703	859	282	401	440	668
1903	570	673	49	497	488	775	911	276	371	408	773

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—SOUTHERN TIER DISTRICT

YEAR	All deaths	Death rate	Deaths under five years of age	Deaths at 70 years and over	Epidemic Diseases									
					Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Diphtheria	Diarrhea
1885	1,741	......	404	......	10	41	31	......	20	18	14	14	48	97
1886	1,858	......	442	......	10	49	25	......	10	5	13	10	76	111
1887	2,518	......	580	......	19	76	33	......	24	6	11	8	111	178
1888	3,276	......	700	......	23	93	42	......	34	32	9	13	112	177
1889	3,390	......	684	......	20	115	24	1	24	10	7	22	117	196
1890	3,354	......	786	......	23	91	23	......	30	35	8	58	136	207
1891	4,648	......	639	......	23	132	10	1	34	32	7	12	195	248
1892	4,984	......	880	......	24	107	7	......	46	14	13	25	248	207
1893	4,838	......	940	......	28	105	8	......	68	51	17	19	294	241
1894	4,869	......	993	......	27	126	12	2	32	6	15	55	192	231
1895	4,780	12.0	960	......	15	118	13	......	7	13	18	33	99	242
1896	4,754	13.0	678	......	18	158	9	......	11	14	12	10	74	239
1897	5,523	14.0	811	......	8	75	11	......	13	27	16	51	91	204
1898	5,468	14.0	891	......	16	112	18	......	15	36	11	35	72	327
1899	5,960	14.0	860	......	30	121	3	......	23	11	6	39	75	295
1900	5,918	14.0	1,008	......	21	141	10	......	28	34	14	42	115	393
1901	5,982	14.0	951	1,784	21	107	8	......	19	33	19	67	80	170
1902	5,811	14.0	967	1,807	19	101	6	6	30	29	23	20	121	196
1903	5,966	13.9	948	1,767	17	111	5	......	29	13	14	60	75	178

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—SOUTHERN TIER DISTRICT—(*Concluded*)

YEAR	OTHER CAUSES OF DEATH										
	Consumption	Acute respiratory diseases	Puerperal	Digestive	Urinary	Circulatory	Nervous	Cancer	Violence	Old age	Unclassified
1885	199	195	31	183	51	145	253	68	86	135	168
1886	187	180	27	141	58	151	283	83	86	207	190
1887	296	283	31	175	57	169	293	74	140	415	295
1888	330	384	31	229	117	230	317	112	166	530	377
1889	300	361	35	254	138	282	416	120	147	436	355
1890	345	589	42	293	131	323	451	130	239	444	299
1891	412	651	36	377	177	415	506	151	233	549	378
1892	438	743	50	391	229	484	565	172	251	548	372
1893	372	584	52	376	239	472	594	164	250	518	391
1894	394	547	53	427	341	452	586	191	235	500	485
1895	418	606	36	370	274	485	574	182	251	559	452
1896	411	501	37	438	291	543	618	217	275	503	391
1897	390	624	66	452	339	623	694	260	332	533	427
1898	401	548	45	444	366	643	780	253	332	546	463
1899	485	689	45	506	374	737	793	280	295	631	548
1900	452	648	52	448	414	663	794	287	308	544	560
1901	441	716	35	499	428	678	838	261	368	550	654
1902	431	574	49	510	407	787	880	259	350	512	549
1903	378	569	53	496	387	902	784	309	385	509	692

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—EAST CENTRAL DISTRICT

YEAR	All deaths	Death rate	Deaths under five years of age.	Deaths at 70 years and over	EPIDEMIC DISEASES									
					Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Diphtheria	Diarrhea
1885	2,444	......	587	......	26	48	21	1	10	14	11	8	80	146
1886	2,947	......	610	......	20	81	19	1	8	5	26	8	119	151
1887	3,465	......	765	......	12	71	40	......	17	17	12	28	106	196
1888	4,222	......	949	......	22	121	37	1	39	53	13	16	182	307
1889	4,290	......	921	......	23	103	39	15	52	16	11	21	145	346
1890	4,918	......	973	......	24	91	25	......	24	36	4	34	112	281
1891	5,113	......	1,066	......	28	135	24	......	25	19	14	17	89	350
1892	5,487	......	1,054	......	29	78	25	1	26	14	27	23	172	254
1893	5,493	......	1,114	......	21	100	17	......	26	71	17	34	257	264
1894	5,224	......	1,060	......	22	116	10	1	23	1	17	28	160	334
1895	5,422	15.5	1,087	......	24	107	17	......	33	4	15	25	71	292
1896	5,371	15.4	1,070	......	27	96	12	......	40	17	11	15	111	336
1897	5,758	16.0	1,042	......	30	70	8	......	21	62	12	30	126	222
1898	5,745	16.0	1,019	......	15	123	14	......	22	35	13	21	91	309
1899	5,687	14.0	788	......	22	107	5	......	14	5	13	33	47	195
1900	5,796	14.0	1,028	......	22	110	10	......	19	47	22	33	61	395
1901	5,801	14.5	894	1,821	21	104	4	2	27	75	14	29	64	181
1902	5,481	14.0	852	1,765	20	72	1	......	9	10	13	30	44	182
1903	5,781	14.3	878	1,870	12	70	1	......	14	30	10	50	50	160

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—EAST CENTRAL DISTRICT—(*Concluded*)

YEAR	OTHER CAUSES OF DEATH										
	Consumption	Acute respiratory diseases	Puerperal	Digestive	Urinary	Circulatory	Nervous	Cancer	Violence	Old age	Unclassified
1885	342	286	22	149	86	197	291	89	104	212	301
1886	388	321	46	209	101	251	385	110	139	387	224
1887	410	324	47	193	123	274	376	107	166	730	216
1888	467	391	68	237	138	348	446	152	178	762	254
1889	476	484	69	267	176	377	497	158	150	660	244
1890	533	782	44	344	197	454	503	178	227	575	496
1891	546	612	38	380	275	431	616	172	214	717	412
1892	586	780	42	429	256	558	686	195	248	668	441
1893	587	783	48	418	266	551	662	192	243	587	445
1894	565	555	50	406	278	503	649	233	244	539	490
1895	584	655	31	416	316	593	682	255	294	587	562
1896	502	579	40	428	309	640	690	258	266	503	495
1897	557	708	51	464	345	738	757	268	280	533	468
1898	519	615	36	461	361	707	761	305	310	536	491
1899	485	744	41	464	352	719	763	310	275	581	507
1900	513	583	34	470	378	720	760	329	276	474	585
1901	563	649	49	457	360	798	765	295	261	528	555
1902	482	514	51	478	415	786	783	306	287	441	560
1903	479	626	45	458	414	885	773	314	322	468	600

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—WEST CENTRAL DISTRICT

YEAR	All deaths	Death rate	Deaths under five years of age	Deaths at 70 years and over	Epidemic Diseases									
					Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Diphtheria	Diarrhea
1885	1,812	......	306	......	15	45	24	......	8	3	12	7	41	90
1886	2,056	......	338	......	14	43	23	......	5	1	6	15	42	112
1887	2,474	......	457	......	8	47	24	......	......	4	12	11	76	144
1888	2,950	......	412	......	24	51	20	2	27	11	8	3	69	112
1889	2,918	......	459	......	14	58	24	4	23	4	7	11	79	136
1890	3,660	......	603	......	15	64	17	1	24	55	9	23	60	163
1891	4,040	......	519	......	18	72	11	2	30	10	11	15	36	153
1892	4,349	......	556	......	20	61	18	......	23	8	19	23	34	124
1893	3,865	......	600	......	12	61	14	......	32	14	13	19	167	146
1894	3,868	......	562	......	17	65	16	1	23	3	12	12	62	158
1895	4,019	13.4	573	......	13	88	13	......	8	5	14	18	56	179
1896	4,086	13.0	693	......	9	54	20	......	21	20	11	20	39	217
1897	4,351	14.5	560	,......	31	45	14	......	9	14	14	18	59	137
1898	4,243	14.3	610	......	9	39	11	......	7	10	7	23	24	219
1899	4,565	14.0	568	......	25	50	8	......	21	9	9	7	60	159
1900	4,461	14.0	654	......	13	91	5	......	15	24	6	27	70	258
1901	4,577	14.3	694	1,646	10	60	6	......	10	29	12	46	23	128
1902	4,448	14.0	598	1,577	12	50	8	6	5	3	15	23	33	156
1903	4,369	15.0	606	1,710	6	116	5	......	6	15	20	16	40	128

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—WEST CENTRAL DISTRICT—(*Concluded*)

YEAR	OTHER CAUSES OF DEATH										
	Consumption	Acute respiratory diseases	Puerperal	Digestive	Urinary	Circulatory	Nervous	Cancer	Violence	Old age	Unclassified
1885	281	196	22	188	85	167	275	56	80	218	152
1886	290	173	24	115	94	151	295	72	93	306	179
1887	285	192	28	149	94	163	256	94	101	594	193
1888	330	234	28	185	103	223	339	87	118	749	229
1889	383	298	18	200	187	255	366	104	146	510	227
1890	391	466	21	291	200	361	440	144	153	509	250
1891	428	443	32	312	204	430	529	169	184	639	322
1892	441	590	40	333	197	499	612	171	193	564	237
1893	409	418	35	309	203	386	511	156	187	457	317
1894	459	370	26	313	336	466	587	153	166	448	326
1895	398	463	27	350	255	461	520	162	160	493	337
1896	375	379	30	337	263	510	642	177	182	430	345
1897	392	507	43	359	289	563	677	199	234	441	311
1898	384	421	33	373	322	530	635	218	216	421	341
1899	395	567	23	355	246	635	697	213	211	486	369
1900	375	418	28	346	285	594	658	232	224	415	332
1901	363	526	32	364	305	625	711	227	235	416	444
1902	341	430	30	351	288	710	678	246	251	399	413
1903	355	491	30	379	300	727	732	276	293	420	467

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—LAKE ONTARIO AND WESTERN DISTRICT

YEAR	All deaths	Death rate	Deaths under five years of age	Deaths at 70 years and over	Epidemic Diseases									
					Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Diphtheria	Diarrhea
1885	4,745	......	1,258	......	24	99	31	......	53	31	31	22	235	285
1886	7,448	......	2,629	......	70	133	63	......	74	6	36	41	434	598
1887	9,065	......	3,370	......	65	175	70	......	124	100	23	35	528	1,018
1888	10,530	......	3,387	......	72	243	86	46	123	69	32	30	538	1,047
1889	9,726	......	3,397	......	81	208	63	9	68	19	24	126	348	840
1890	11,120	......	3,360	......	107	250	89	......	64	109	29	43	363	844
1891	12,968	......	4,270	......	91	306	67	......	126	79	35	54	556	961
1892	11,820	......	4,331	......	71	269	55	......	171	25	58	112	675	923
1893	12,649	......	4,242	......	60	267	27	......	238	38	39	74	499	1,238
1894	11,721	......	3,941	......	50	295	16	2	115	26	33	114	472	1,217
1895	11,519	15.5	3,534	......	47	227	24	......	38	123	26	72	454	1,041
1896	11,193	15.0	3,367	......	49	188	19	......	43	53	22	86	437	1,055
1897	11,368	15.3	3,021	......	51	187	15	......	44	66	24	110	390	865
1898	11,446	15.4	2,842	......	92	224	18	......	27	7	16	97	179	956
1899	11,961	13.7	2,867	......	58	201	9	1	59	73	32	66	197	845
1900	12,278	14.0	3,240	......	48	205	7	1	66	116	23	103	202	1,055
1901	12,875	15.0	2,963	3,096	81	250	4	3	57	65	38	123	238	780
1902	12,292	14.0	2,930	2,753	50	252	5	83	48	89	31	67	208	694
1903	13,498	15.0	3,120	3,017	60	280	3	29	82	77	39	108	318	681

MORTALITY IN THE SANITARY DISTRICTS SINCE 1885—LAKE ONTARIO AND WESTERN DISTRICT—(*Concluded*)

YEAR	OTHER CAUSES OF DEATH										
	Consumption	Acute respiratory diseases	Puerperal	Digestive	Urinary	Circulatory	Nervous	Cancer	Violence	Old age	Unclassified
1885	617	460	73	280	189	337	658	177	198	390	555
1886	937	707	55	441	226	488	1,047	204	304	579	1,005
1887	950	750	52	540	267	479	1,249	259	329	975	1,017
1888	1,091	1,063	116	687	330	666	1,397	275	528	848	1,283
1889	1,016	1,029	107	670	341	688	1,285	307	503	778	1,336
1890	1,180	1,623	80	889	389	693	1,417	313	564	653	1,419
1891	1,347	1,969	119	1,000	560	868	1,596	392	596	816	1,634
1892	1,281	1,839	91	986	505	905	1,618	333	630	824	1,449
1893	1,179	1,510	121	1,017	542	982	1,688	398	649	823	1,265
1894	1,204	1,324	90	769	521	959	1,565	425	595	785	1,144
1895	1,209	1,552	113	758	588	1,014	1,487	414	547	788	1,001
1896	1,183	1,355	105	742	680	1,078	1,465	459	569	762	893
1897	1,075	1,482	122	792	696	1,116	1,509	495	615	835	882
1898	1,038	1,394	103	814	749	1,173	1,549	530	634	830	1,017
1899	1,114	1,623	93	837	778	1,231	1,553	548	600	870	1,196
1900	1,129	1,408	111	841	824	1,274	1,588	569	663	859	1,186
1901	1,155	1,579	116	967	765	1,337	1,618	665	820	814	1,400
1902	1,080	1,301	101	918	805	1,412	1,670	624	807	787	1,315
1903	1,078	1,454	126	1,046	873	1,596	1,797	678	898	809	1,472

MORTALITY OF THE STATE SINCE 1885

YEAR	All deaths	Death rate	Deaths under five years of age	Deaths at 70 years and over	EPIDEMIC DISEASES									
					Cerebro spinal meningitis	Typhoid fever	Malarial diseases	Small pox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrhoea
1885	80,407	......	30,027	......	446	1,067	944	83	1,184	1,170	354	834	4,508	7,301
1886	86,801	......	32,928	......	572	1,169	899	39	1,011	895	357	1,244	5,597	7,028
1887	96,453	......	35,114	......	540	1,327	935	175	1,367	1,205	327	447	6,490	9,258
1888	104,450	......	38,345	......	490	1,483	818	212	2,452	944	342	994	6,448	8,774
1889	104,233	......	40,248	......	402	1,550	746	80	2,205	899	298	1,303	5,855	8,294
1890	116,830	......	37,392	......	474	1,612	738	4	918	1,161	312	1,156	4,915	8,468
1891	123,790	......	42,740	......	589	1,926	619	4	2,252	1,200	367	825	5,072	9,179
1892	126,802	......	42,434	......	649	1,664	618	143	2,177	1,350	477	921	5,918	9,185
1893	123,906	......	41,648	......	875	1,685	493	252	1,626	789	366	1,203	5,947	9,056
1894	118,195	......	41,472	......	489	1,640	422	308	1,227	900	331	1,020	6,592	8,956
1895	121,735	......	42,002	......	546	1,716	409	11	850	1,266	370	1,169	4,989	9,055
1896	120,683	18.5	40,136	......	510	1,542	449	3	759	1,495	340	996	4,597	8,776
1897	117,078	18.4	35,771	......	588	1,351	380	27	841	873	308	825	4,115	7,267
1898	120,968	18.1	37,118	......	695	1,810	404	1	837	938	237	1,155	2,612	8,499
1899	121,831	17.8	35,386	......	702	1,604	248	21	780	756	353	886	2,786	6,480
1900	128,468	17.8	39,204	......	531	1,948	309	14	689	1,333	466	1,020	3,306	7,969
1901	129,257	17.8	35,775	22,933	492	1,741	263	445	1,480	859	363	721	3,026	9,337
1902	128,494	17.0	31,215	20,709	456	1,818	169	442	1,215	929	314	928	2,859	8,815
1903	126,536	16.7	32,768	22,050	454	1,665	187	41	1,057	721	354	811	3,035	7,480

MORTALITY OF THE STATE SINCE 1885—(*Concluded*)

YEAR	OTHER CAUSES OF DEATH										
	Consumption.	Acute respiratory diseases	Puerperal	Digestive	Urinary	Circulatory	Nervous	Cancer	Violence	Old age	Unclassified
1885	11,288	10,864	974	4,843	4,069	4,903	8,651	1,887	2,994	4,889	7,728
1886	11,947	11,389	884	5,066	4,805	5,238	8,799	2,050	3,296	5,990	8,981
1887	11,609	11,557	886	5,599	4,582	5,737	9,957	2,363	3,780	8,676	9,786
1888	12,388	13,756	1,069	6,146	4,926	6,394	11,174	2,497	3,842	7,994	11,310
1889	12,390	13,833	979	6,501	5,782	6,886	11,266	2,638	3,834	5,980	12,615
1890	13,331	18,053	928	7,696	5,688	7,306	11,593	2,868	4,542	5,484	13,728
1891	13,445	20,647	1,058	8,486	6,473	8,480	13,166	3,023	5,028	6,530	15,371
1892	13,471	20,482	1,131	8,920	6,502	9,013	14,009	3,152	5,543	6,385	14,647
1893	13,123	19,807	1,054	8,834	6,955	9,042	13,826	3,232	5,295	5,826	14,622
1894	12,824	15,885	911	8,745	6,946	8,451	12,948	3,305	5,487	5,497	15,310
1895	13,267	17,725	969	8,892	7,449	9,966	11,724	3,554	5,889	5,569	16,380
1896	13,265	16,820	972	8,956	7,770	10,486	11,925	3,789	7,022	5,377	14,835
1897	12,641	16,277	1,018	8,963	7,866	10,905	12,124	4,131	6,172	5,516	14,950
1898	12,979	16,350	920	10,101	8,641	10,511	13,312	4,335	6,520	5,524	14,641
1899	13,412	17,968	877	10,163	9,064	10,606	13,177	4,533	6,093	6,068	15,324
1900	13,590	19,232	1,136	10,614	9,501	10,676	12,993	4,871	6,714	5,402	16,134
1901	13,766	17,589	1,068	7,478	9,558	11,949	13,366	5,033	7,926	5,439	17,388
1902	12,582	16,966	1,034	7,235	9,604	12,889	12,964	4,990	7,058	4,949	15,833
1903	13,194	17,339	1,110	7,232	9,998	13,561	12,966	5,456	7,646	4,765	17,466

The populations of the Sanitary Districts at the U. S. census periods were as follows:

	1890	1900
Maritime district	2,778,630	3,753,614
Hudson Valley district	679,647	690,000
Adirondack and Northern district	379,577	394,772
Mohawk Valley district	368,503	408,974
Southern Tier district	401,954	428,543
East Central district	382,960	401,082
West Central district	314,875	315,945
Lake Ontario and Western district	718,473	876,206
Entire State	6,024,619	7,269,136

Diarrhoeal diseases caused one-half the epidemic mortality of the state for the year, and 6 per cent of the total mortality. It has varied in past years from 7.6 per cent to 5.3 per cent of the entire number of deaths.

The July *Bulletin* contained the following:

Estimation of Milk by the General Practitioner.—Milk enters so largely into the dietary of children, and its quality if of such importance, especially at this season, when its susceptibility to change and their susceptibility to the ill effects thereof are greatly increased, making the diarrhoeal mortality of early life the great contributor to midsummer deaths—almost one-fifth of all deaths being from this cause—that the following contribution from Dr. H. L. K. Shaw, of Albany, will be a help towards the control of this mortality in so far as its suggestions may be put into practice by those who have to do with this article of food of infants and young children.

The prevalent idea that expert chemical skill, much time and expensive apparatus are required for milk analysis, or to determine the character of the milk from a mother whose baby does not thrive, prevents its being done; but to feed infants intelligently it should be done from time to time. It can be done almost as readily as a complete urinalysis and requires no more skill.

First, the *total acidity should be determined.* This is especially important with cow's milk, for milk with an acidity over 16 per cent should never be fed to infants; the souring points is 3 per cent. There is close relation between acidity and the number of bacteria, souring being due to lactic acid producing bacteria, and milk containing many bacteria will have high acidity. The cleanliness of the dairy, care of the milk and utensils, proper feeding of the cows, all affect the acidity of the milk and are ascertained by it.

The few articles required for this test are an alcoholic solution of phenophthaline, deci-normal sodic-hydrate solution or saturated lime water solution and a few pieces of apparatus. Five cubic centimeters of the milk are measured into a beaker and two drops of the phenophthaline solution added. A small glass cylinder graduated to tenths of one c.c. is filled to the 10 c.c. mark with one of the alkaline solutions, and with a medicine dropper added drop by drop to the milk well stirred with a glass rod until a faint pink color is obtained, the amount used to effect this (neutralizing of the milk) being noted. If the sodic-hydrate solution has been used, multiply the amount used by .009 (or by .0045 if the lime water solution), divide by the number of c.c. (5) of milk and multiply by 100, and this gives the total acidity of the milk. A simpler but less accurate method of testing acidity is by the use of Farrington alkaline tablets, which contain a definite quantity of alkali with coloring matter; one dissolved in one-half ounce of water, adding two drams of this to a like quantity of milk, if the mixture is pink the milk has less than two-tenths per cent of acidity, or if white, more than two-tenths and is unfit for use; other combinations give relative results.

The *specific gravity* of cow's milk (1,029 at 60° F.) is raised by a high percentage of proteids and lowered by increase of fat or by added water. In using the lactometer, chiefly to determine the percentage of solids in the milk, care must be taken in the reading and the temperature noted and accounted for. If below normal either the milk contains excess of cream or has been watered; if above and the fat percentage low the milk has probably been skimmed.

The *percentage of fat* may most simply be determined by the Babcock tester; a small *hand* centrifuge modification of it devised by the writer, and alike useful for urinary work, is practical for physician's use. Sulphuric acid, the only chemical, is mixed with a like quantity of milk and by the centrifuge the fat is separated and measured.

The *total solids,* i. e., the nitrogenous matter, sugar and mineral salts, require complex analysis to determine, but as their ratio is rarely altered a minute chemical examination is seldom necessary, but can be determined from the specific gravity and percentage of fat. Babcock's formula, which is accurate and simple. consists in dividing the specific gravity by 4 and adding to this one-fifth of the per cent. of fat, the result giving the total solids.

The per cent. of sugar is almost constant in both human and cow's milk (6.5% and 4.5%) and it is not necessary to estimate it. but it can be done by the well-known Fahling's quantitative test.

The amount of proteids can be obtained approximately by subtracting the percentage of fat, sugar and salts from the total solids. The average salts in human milk is two-tenths per cent. and in cow's milk seven-tenths per cent. Thus, if in a specimen of cow's milk the total solids amount to 12.4% and the fat to 3.5%, the solids not fat would be 8.9%; subtract 5.3; the sum of the salts and sugar percentage, and 3.6 is obtained as the amount of proteids; this if not strictly accurate gives information sufficiently reliable for ordinary purposes.

Of *preservation* added to milk the one in most common use is formaldehyde. If a violet ring appears at the junction of sulphuric acid and milk, in the Babcock test bottle, formaldehyde is present. More delicate is a test made by dissolving 1 gram of phloroglucin in 100 c.c. distilled water; of which solution 5 c.c. is added in a test tube to 10 c.c. of milk, and 1 c.c. of liquor potassæ (U. S. P.), and a pink color develops at once if formaldehyde is present. The detection of other preservatives requires special skill. Their presence, however, must be strongly suspected if the milk remains sweet to taste and smell when the acidity is three-tenths of one per cent. or over.

Diphtheria, next to diarrhoea the largest contributor to the epidemic diseases, caused 3,035 deaths, or nearly one-fifth of the deaths of this class, and 2.4 per cent. of the total, which is the proportion of the last five years and very much less than in the years prior to 1898, as shown by the following:

In each 1000 deaths there were from diphtheria in the—

DISTRICTS	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903
Maritime	71	52	45	43	21	28	32	28	28	31
Hudson valley	31	28	26	28	18	19	21	20	16	12
Adirondack and Northern	28	18	27	25	11	10	14	17	9	10
Mohawk valley	28	11	15	20	15	19	20	22	20	16
Southern tier	39	21	15	17	18	18	20	13	21	14
East central	30	13	20	22	16	9	10	11	8	9
West central	17	14	10	14	6	12	15	8	8	8
Lake Ontario and Western	40	39	40	34	16	16	16	18	17	22
Entire state	56	41	38	35	22	23	25	23	23	24

Antitoxin for the treatment of diphtheria has been supplied from the antitoxin laboratory of the State Department of Health, the director of which, Dr. Herbert D. Pease, contributed the following to the November *Bulletin:*

The Department's Distribution of Diphtheria Antitoxin.—Reports from many localities in the State indicate a considerable increase in the total number of cases of diphtheria. That the character of the disease is more severe than at the same period last year is also without doubt true. During November there were 112 deaths from the disease reported from the entire State, except the cities of New York, Buffalo, Albany and Yonkers. In November, 1902, there were but 64 deaths from the same portion of the State.

In view of this increase in the amount and severity of the disease, it becomes highly important for all health officers to keep a stock of antitoxin constantly on hand in excess of their regular needs, in order to be ready to meet any suddenly increased demand. The sending of a properly filled in requisition card to the Department is all that is required in order to obtain the antitoxin. If such supplies are kept in stock by health officers the sending of telegrams and telephone messages for rush orders will be necessary in but few cases. Experience has shown that it is impossible to avoid delays of many hours before supplies, sent out in response to telegrams, arrive at their destination, and for this reason, if for no other, a sufficient supply to cover all possible needs should be kept on hand.

In deciding how much is likely to be needed not only the number of cases occurring but the general character of the disease should be considered. Many physicians, failing to take into consideration that a severe type of the disease needs much larger doses of antitoxin, have been administering the same doses of from one to two thousand units—which gave good results in the milder cases of the disease occurring a year ago—in the severe cases prevalent this fall, and without obtaining the desired results. The doses recommended in the circular which accompany each bottle are the minimum amounts which should be used in each instance. These or larger doses should always be continuously repeated at least every eight hours until convalescence is definitely established.

Not less than three thousand units should be the primary dose in any severe case and the same or a larger one should be repeated in not less than eight hours unless convalescence is established within that period. These amounts should be injected every few hours until recovery takes place. There is no limit to the amount of antitoxin which can safely be given and almost numberless instances could be cited where aggregate amounts of from thirty to fifty thousand units have been used in each case with the greatest benefit. Cases almost moribund have entirely recovered after this prompt and energetic use of antitoxin. Physicians should also remember that the deaths from heart failure which frequently occur after apparent convalescence from the disease can, without doubt, be avoided by the use of amounts of antitoxin in excess of those actually needed to cause improvement in the local and general symptoms, if given reasonably early in the course of the disease.

It seems almost unnecessary to urge that antitoxin be administered at the earliest possible moment not merely with the object of saving the patient's life but to avoid, as well, the development of paralysis and similar sequelæ. For the same reasons, the quicker the disease, in a given case, is brought under control by the use of antitoxin, the less the probability of the development of the troublesome paralysis and the fatal heart failure.

The restriction of the distribution of antitoxin to bottles containing only 1500 and 2500 units is not for the purpose of indicating that these are proper doses for all cases, but these sizes are most convenient for the purposes of immunization and for use in the mildest types of the disease. Thus one 1500 bottle serves for the immunization of three persons each receiving 500 units, or would constitute a dose for a child who, having a slightly inflamed pharynx, had been associating with other cases of diphtheria; or two bottles of this size would constitute a dose of 3000 units, which should be given repeatedly to a moderately severe case. The 2500 unit bottles are intended chiefly for therapeutic use and whenever possible contain a larger number of antitoxic units per cubic centimeter of serum than do the 1500 unit bottles. One such bottle constitutes a primary or repeated dose for a mild case of the disease and two constitutes the primary dose which should be given to every severe case and in every case of croup. It should be repeated every few hours until marked improvement results, and even then it should be again repeated in twelve to twenty-four hours as a matter of precaution. Not until all membrane has been expelled, the temperature normal and all visible constitutional symptoms have disappeared should the physician cease to give antitoxin.

Health officers should also be familiar with the known facts concerning the transmission of diphtheria from person to person. It is generally believed by those having the best opportunities for observation that the diphtheria bacillus is more often transferred by convalescents and well persons having it in their throats than by contaminated articles—clothing, etc. That fully virulent diphtheria bacilli remain in the throats of convalescents for periods varying from a few days to weeks and months is absolutely established.

Salmon[1] with several years' experience in the Willard State Hospital, has recently shown that the average duration of diphtheria bacilli in the nose and throat of 100 cases was 21.86 days from the onset of the disease. The severity of the attack did not influence this period, which was 21.4 days for the severe and 22.4

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[1] Albany Medical Annals. December, 1903, p. 648.

for the mild cases. The writer showed the average duration of about 1500 cases in Philadelphia five years ago to be 23.8 days.

Of Salmon's 100 cases 60 would have been released from quarantine still capable of transmitting the disease if discharged at the end of two weeks, 37 if discharged in three weeks, and 27 if sent out in four weeks. By the examination of cultures made from both the nose and throat of each case, he shows that 54 still infected persons would have been discharged if released after one negative culture, and 13 after two negative cultures. If, however, the two negative cultures were taken two weeks after the onset of the disease, but six infected persons would have been released, and he recommends the application of this method for the determination of the best time consistent with practical quarantine work for the release of convalescents.

Typhoid fever caused no more than the average mortality for the entire state. Two conspicuous epidemics occurred, at Ithaca and in West Seneca near Buffalo, which made large the mortality in their sanitary districts, but in the Maritime and Hudson valley districts the number of deaths was less than usual; in the latter district the mortality is the lowest on record, and in the former there is a considerable falling off from the high mortality of 1892.

In each 1000 deaths there were from typhoid fever in the—

DISTRICTS	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903
Maritime	8	8	8	8	10	8	10	10	11	10
Hudson valley	22	33	35	21	28	26	28	20	23	14
Adirondack and Northern	22	25	26	18	23	26	26	17	20	21
Mohawk valley	21	20	13	17	22	13	23	17	14	16
Southern tier	26	26	32	14	20	20	24	18	17	20
East central	22	20	18	12	21	19	20	18	13	14
West central	16	10	13	10	10	11	20	18	11	24
Lake Ontario and Western	25	20	16	16	21	17	17	20	20	21
Entire state	13	14	13	12	15	18	17	13	14	14

Scarlet fever caused 1057 deaths, a decrease from 1215 in 1872, and 1430 in 1891, prior to which for a period of six years the mortality had been low. The decrease this year is limited to the Maritime district.

In each 1000 deaths there were from scarlet fever in the—

DISTRICTS	1896	1897	1898	1899	1900	1901	1902	1903
Maritime	8	9	10	8	6	15	13	10
Hudson valley	3	1	2	2	4	7	5	7
Adirondack and Northern	6	1	1	4	4	6	6	4
Mohawk valley	5	2	2	2	3	4	13	11
Southern tier	2	2	3	5	5	3	5	5
East central	9	8	4	8	3	5	2	2
West central	5	2	2	5	8	2	1	1
Lake Ontario and Western	4	4	3	5	5	4	4	6
Entire state	6	7	7	6	5	11	11	8

Measles caused 354 deaths, 200 fewer than last year, which is the decrease of the Maritime district.

In each 1000 deaths there were from measles in the—

DISTRICTS	1900	1901	1902	1903
Maritime	11	6	10	7
Hudson valley	10	5	2	3
Adirondack and Northern	9	15	5	3
Mohawk valley	11	8	3	3
Southern tier	6	5	5	2
East central	8	13	2	5
West central	5	6	3	3
Lake Ontario and Western	10	5	7	6
Entire state	10	6	8	9

Smallpox caused 41 deaths, of which 25 occurred in Rochester where there was a prolonged epidemic in the first half of the year. After general quiescence during the summer it developed pretty widely in the fall, the chief centres being at the end of the year in Chautauqua and Cattaraugus counties, where it was for a long time very general; in Orleans, Niagara and Wayne counties and in the region about northern Saratoga county. Limited outbreaks occurred in numerous other localities. Fatalities occurred in all the sanitary districts except the Southern Tier, the East and West Central districts.

Consumption causes a but little varying mortality from year to year, about 13,000 deaths annually for the last fifteen years, and from 10 to 11 per cent. of the total mortality. The Maritime district always has the highest mortality and the Southern Tier the lowest.

In each 1000 deaths there were from consumption in the—

DISTRICTS	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903
Maritime	110	112	110	106	115	135	114	115	110	117
Hudson valley	111	107	115	112	115	110	110	113	107	100
Adirondack and Northern	115	114	116	108	112	99	100	110	105	92
Mohawk valley	111	113	104	95	106	91	90	93	85	90
Southern tier	81	86	86	75	75	83	76	75	75	65
East central	108	98	93	96	90	85	90	96	90	80
West central	118	100	90	90	90	87	84	80	77	75
Lake Ontario and Western	103	105	101	95	100	93	92	90	85	80
Entire state	108	109	110	108	108	110	110	106	102	104

Acute respiratory diseases caused 17,339 deaths, the largest contributor to mortality of any group of diseases, exceeding by 3500 the entire group classed as epidemic. Of these, 10,225 or 60 per cent. were from *pneumonia.* In 1902 there were 17,000 deaths from acute respiratory diseases of which 8800, or about 55 per cent. were from pneumonia. Prior to that time no record has been kept of pneumonia, and it cannot be assumed that the present relative proportion can be applied to former years.

Percentage of acute respiratory to total mortality in the—

DISTRICTS.	1897	1898	1899	1900	1901	1902	1903
Maritime	14.5	15.0	16.0	17.4	14.5	16.0	16.0
Hudson valley	15.0	12.5	13.0	13.0	13.0	11.7	12.5
Adirondack and Northern	12.8	11.0	13.1	11.8	12.5	9.2	9.7
Mohawk valley	13.5	10.0	13.5	11.5	13.7	10.5	10.3
Southern tier	12.0	10.0	11.7	11.0	12.0	10.0	9.5
East central	12.3	11.0	13.0	10.0	11.2	9.5	10.8
West central	11.7	10.0	12.5	9.4	11.5	9.5	10.2
Lake Ontario and Western	13.0	12,1	13.5	11.5	12.5	10.5	10.7
Entire state	14.0	13.5	14.7	15.0	13.5	13.8	13.7

In these districts above tabulated, in the order given, the following percentage of the total mortality of 1903 was from *pneumonia:* 8.9; 7.0; 5.7; 6.4; 5.5; 6.4; 6.0; 5.1; and in the entire state 8.0 per cent. of the total mortality was from pneumonia.

Epidemic influenza (grippe) is closely allied to pneumonia or acute respiratory diseases; at least it chiefly finds expression under this class, which is apparent from a reference to a preceding table "Mortality of the state since 1885." This table shows that in 1890 there was an abrupt rise in the mortality from acute respiratory diseases by over 4000. Our grippe epidemics began in December, 1889, and the following table shows approximate data concerning recurring epidemics; the number of deaths is merely an estimate, for no one can ever tell to what degree absolutely this disease contributes to mortality since it finds expression in divers ways, but the number of estimated deaths is a guide to the severity of the successive recurrences. It will be found that rise and fall in this table corresponds with that of acute respiratory diseases as given in the earlier table referred to.

This table shows a series of influenza epidemics:

Time of occurrence.	Height reached.	Duration.	Number of deaths.
1890	January, 1890	3 months	5,000
1891	April, 1891	6 months	8,000
1891–2	January, 1892	5 months	8,000
1893	April, 1893	6 months	6,000
1893–4	January, 1894	4 months	3,000
1895	February, 1895	4 months	5,000
1896	March, 1896	5 months	2,750
1897	March, 1897	4 months	3,000
1898	March, 1898	6 months	2,500
1898–9	January, 1899	5 months	7,000
1900	March, 1900	6 months	11,500
1901	January, 1901	5 months	7,000
1902	February, 1902	6 months	5,000
1903	March, 1903	6 months	8,000

The following is from issues of the *Monthly Bulletin:*

The State is at present in the course of an annually recurring epidemic of grippe, as it is commonly called, which began in the late fall but made little impress prior to January. A few deaths were reported from it as early as October, but the estimated mortality was not above 500 until January, when it was placed at 1200 for the month, and for February it was increased to 1500. It appears probable that the mortality of March was increased 2000 by this disease, and it is likely that this month will be the one of the height of the epidemic, as available sources of information indicate a decrease thus far during the succeeding month of April.

This number is very far in excess of the actually reported deaths to which influenza was assigned as a cause or in any way contributory. In January the number of certificates of death received, outside of New York city, upon which grippe appeared was 96; in February, 102; in March, 244. During these months respectively New York city has reported 25, 137 and 190 deaths from influenza, with 20 during the three months preceding. Albany reports 21 during the three months. Influenza does not appear as a cause of death in Buffalo on recent reports.

Epidemic influenza entered as a disturbing element into the mortality records of the State in December, 1889. No specified record has been kept since then of the actual reported mortality from this cause. There occurred however a violent deviation in the death rates and a mortality so excessive during its annual recurrences that no other reason could be assigned, and as the reported deaths from it did not account for the increase an attempt was made to estimate the probable variation from the normal average and credit this to this exotic cause. The secondary effects of the disease are so varied that it is probable that this as a contributory cause will be largely overlooked in the returns of death; and moreover, even now when the disease seems to have become domesticated, it is a qustion as to how exactly the term may be employed when it is given as a cause of death directly or secondarily. For this reason estimates have been given for its mortality in the succeeding epidemics since it first came into our death records, which are loosely made, but express no doubt the contribution of this disease to the number of deaths better than the actual returns. It has increased chiefly the mortality from acute respiratory disease; deaths from consumption have increased during its prevalence; the nervous system, the digestive system and the circulatory system have all had larger mortality; old age as a cause of death has increased, and there has been an especial increase in the unclassified causes of death under which come various enfeebling conditions.

In 1890, the first year on which it made an impress, the deaths for the year rose from 104,233 of the year before (which was fully up to the average of the five preceding years) to 116,830. In January of that year, when the epidemic was at its height, there were 13,000 deaths, against 8337 in the preceding January. In April, 1891, the high point of the epidemic of that year, there were 14,000 deaths, the largest mortality of any month on record in this State, exceeding by nearly 500 the largest July mortality, when we have our greatest summer diarrhoeal mortality. In January, 1892, 13,500 deaths occurred; in April, 1893, nearly 12,000; in February, 1895, 10,800; in March, 1900 (the intervening years having had milder grippe epidemics), over 13,000. These are months in which epidemics were at their height, and they all show mortalities exceeding the average by from 1000 to 2000 of our July rates when midsummer conditions affect our large city death rates.

It is noteworthy that the infant mortality has not been increased; in 1890 there were fewer deaths under five years of age than in 1889. In fact, in 1900, when our severest grippe epidemic, lasting for six months, occurred, there were 1000 fewer deaths in early life than in 1889.

For five years prior to 1900 the mortality from acute respiratory disease was a little above 12,000 annually, being 13,800 in 1889 on which year fell part of the initial epidemic. In 1890 it rose to 18,000 and during the three following years was 20,000. In 1894, when the grippe epidemic was mild and short of duration it was a little under 16,000, but has never since been so low, in 1900, when our greatest epidemic occurred, being 19,232. Prior to 1900 the average year's mortality from diseases of the nervous system was about 10,000; since then it has been 12,000 to 14,000, though larger numbers have not corresponded always with larger epidemics. There were 6000 deaths a year before 1900 from diseases of the circulatory system, and since then from 7000 to over 12,000; but here also it is true that increase has not corresponded with severity of epidemic, and it is also the case that there has been a pretty uniform increase in deaths assigned to this cause year by year. This is likewise true of diseases of the urinary system. The most uniform increase of grippe epidemics has been in acute respiratory diseases and in the group of unclassified diseases.

It seems evident that no useful estimate can be made of the effect of epidemic influenza from the mortality as returned on death certificates.

Influenza as a reported cause of death is interesting in its associations and relationships. During February, March, April and May, 600 certificates, coming from the smaller cities, rural towns and villages throughout the State, came to hand upon which influenza or grippe (the more common term employed) was reported as the direct or contributory cause of death. These represent but a small part of the estimated mortality from this cause, but they include all of the deaths, the certificates of which are sent to the State Department of Health for filing, that is, all except of deaths occuring in New York city, Albany, Yonkers and Buffalo, and upon which in any way whatever the term has appeared in connection with the reported cause of death. As to *age* and *sex* of decedents, the following data are taken from these certificates:

Number of deaths.	Age.	Male.	Female.
11......	Under 15 days old..................	5	6
29......	Between 1 and 12 months..........	19	10
7......	Between 1 and 2 years of age.....	3	4
9......	Between 2 and 5 years of age.....	4	5
3......	Between 5 and 10 years of age.....	1	2
11......	Between 10 and 20 years of age.....	5	6
19......	Between 20 and 30 years of age.....	9	10
25......	Between 30 and 40 years of age.....	11	14
28......	Between 40 and 50 years of age.....	13	15
42......	Between 50 and 60 years of age.....	18	24
79......	Between 60 and 70 years of age.....	29	50
139......	Between 70 and 80 years of age.....	63	76
97......	Between 80 and 90 years of age.....	40	57
11......	Over 90 years old..................	2	9
510		222	288

The first decade of life, and in fact the first twenty years, seems to be almost immune to the effects of the disease; and the middle period of life, to the age of 45 or 50, is resistant to it so far as reported fatality is an indication. The susceptible age of infancy is an apparent exception, as more deaths are ascribed to it in the first year than in the next twenty. It may be noted that years of severe grippe epidemics do not show increase in the infant mortality, that is of deaths under five years of age, the actual number of deaths being in fact fewer in certain years than in others during which there was less prevalence. Prior to the age of 50 only one-fourth of these deaths occurred; after which there is a marked increase in each decade, the greatest number falling between 70 and 80. The months of December, January, February and March, during which influenza is prevalent, have much larger mortality at 70 years of age and over than the remainder of the year.

There are considerably fewer deaths of males than females and this is true of every decade except during the first year of life, and especially true in old age. This may be noted in connection with the much greater susceptibility of men than women to pneumonia, as generally accepted.

The diseases and conditions associated with grippe on death certificates are numerous. Of the 11 deaths in the first fortnight after birth, grippe alone was given save in 3, where congestion of the lungs was noted. Of 40 deaths during the first year, it was given alone or in immediate connection with pneumonia or bronchitis in 30; in 6 meningitis was secondary, and in 4 affection of the digestive system. At age 1 to 10 years, pneumonia and bronchitis were associated with 8 returns, meningitis with 5, otitis media 1, intestinal disorders 3, nephritis 1, membranous croup 1.

In the next decade grippe was given as the primary cause, with pneumonia secondary to it in 2 returns, meningitis 2, digestive disease 2, endocarditis 1, heart failure 2, and in one consumption existed.

In the third decade, of 19 deaths, 14 were primarily due to grippe, pneumonia being secondary in 3, nephritis in 1, meningitis, mastoid inflammation and acute mania in 4, pyæmia and septicæmia in 3. Consumption and other enfeebling conditions preexisted in 5.

In the next three decades (age 30–60), of 95 deaths, 25 had intercurrent pneumonia a few days after onset, 5 bronchitis, 8 digestive affections, as peritonitis, gastritis or intestinal obstruction, 2 acute nephritis, 5 meningitis and 4 apoplexy, 3 acute valvular disease of the heart, 1 premature parturition; 14 from grippe alone. In 25 preexisting enfeebling conditions are reported—consumption, heart disease, diabetes, cancer.

Of 326 deaths at 60 and over, 55 had accompanying pneumonia, 22 acute bronchitis, 2 acute nephritis, 8 acute digestive disease, 14 apoplexy, 4 erysipelas and septicæmia. Grippe alone or with senile enfeeblement was returned for 136, and of prior enfeebling conditions. heart disease existed in 40, digestive diseases in 10, nephritis or cystitis in 10, and in 25 chronic bronchitis or consumption.

Two-fifths of the 510 deaths at all ages were reported from grippe alone or with some indefinite condition, as heart failure; pneumonia was a sequence of 100; acute bronchitis of 40; affection of the nervous system of 40; of the digestive system with 25; 6 had acute nephritis; 4 heart disease; septic conditions of 7.

The duration of the disease was four days to three months, generally about ten days, varying with complications, death following with many doubtless long after the active influenza from secondary ills not attributed to the original disease. On substantial grounds this disease is estimated to have caused many more deaths than those attributed to it on the certificates. The mortality from the present epidemic, November through May, has been placed at 7200; that of June has perhaps been 300; outside the large cities 50 deaths are reported from it.

Bright's disease caused 7960 deaths during the year, or 80.0 per cent. of the deaths from diseases of the urinary system, and 6.0 per cent. of the total mortality from all causes. Its percentage of mortality was highest in the Maritime district; next highest in the Hudson valley and Mohawk valley districts; and lowest in the more rural districts, this being at least to some degree true. The proportions are as follows: In the Maritime district 6.7 per cent. of the deaths were from Bright's disease; Hudson valley, 5.7; Adirondack and Northern, 4.0; Mohawk valley, 5.3; Southern Tier, 4.0; East Central, 4.8; West Central, 3.5; Lake Ontario and Western, 4.0 per cent.

Cancer caused 500 more deaths than in 1902, which was a year exceptional in that its cancer mortality was less than the year preceding, as may be seen by reference to the table "Mortality of the State since 1885".

The distribution of cancer in the sanitary districts of the state and its relative prevalence in them is shown by the following tables. The central, especially the east central, and western part of the state have the largest mortality.

Reported mortality from cancer in the sanitary districts for 8 years—

DISTRICTS	1895	1896	1897	1898	1899	1900	1901	1902	1903
Maritime	1,805	1,894	2,081	2,174	2,302	2,449	2,651	2,557	2,828
Hudson valley	356	404	425	419	415	476	459	497	535
Adirondack and Northern	173	192	213	212	212	234	208	220	259
Mohawk valley	207	189	242	264	255	295	267	282	275
Southern tier	182	217	260	258	280	287	261	259	309
East central	255	258	268	305	317	329	295	304	314
West central	162	177	199	218	213	232	227	246	275
Lake Ontario and Western	414	459	495	580	548	569	665	624	678
Entire state	3,554	3,789	4,131	4,385	4,538	4,871	5,063	4,990	5,456

Following the estimated population of the *Monthly Bulletin*, there were in the sanitary districts:

Deaths from cancer per 100,000 population—

DISTRICTS	1898	1899	1900	1901	1902	1903
Maritime	58	57	62	66	65	61
Hudson valley	60	56	68	67	72	77
Adirondack and Northern	54	54	60	58	58	80
Mohawk valley	67	65	74	65	67	66
Southern tier	60	64	65	63	60	73
East central	74	74	79	74	76	79
West central	70	65	71	71	78	85
Lake Ontario and Western	61	61	65	75	71	75

Record of each reporting local board of health, showing total deaths from all causes and from the principal zymotic diseases for 1903, *by counties*

[Cities are printed in SMALL CAPS, villages in *italic* and towns in Roman type.]

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Albany county	**171, 430**	**3, 009**	**8**	**53**	......	**36**	**15**	**36**	**26**	**88**	**337**
ALBANY	100, 000	1, 808	3	19	......	20	12	17	15	37	228
COHOES	24, 000	465	3	22	......	12	1	9	4	35	56
Berne	1, 917	34	1	......	......	......	......	......	......	......	......
Bethlehem	4, 226	48	......	2	......	......	......	......	......	1	......
Coeymans	3, 952	51	......	1	......	......	......	1	......	......	2
Guilderland	3, 530	40	......	......	......	......	......	......	......	......	3
Knox	1, 244	20	......	......	......	......	......	......	......	1	1
New Scotland	3, 058	41	......	......	......	......	......	1	......	......	1
Rensselaerville	1, 795	33	......	......	......	......	......	......	......	1	......
Colonie	7, 035	126	......	1	......	4	......	1	2	1	3
Westerlo	1, 632	23	......	......	......	......	......	......	......	......	2
WATERVLIET	14, 321	238	......	8	......	......	2	3	4	10	31
Green Island	4, 770	82	1	......	......	......	......	4	1	2	10
Allegany county	**41, 501**	**562**	**2**	**9**	......	......	......	**7**	**1**	......	**16**
Alfred	1, 615	13	......	1	......	......	......	......	......	......	......
Allen	655	8	......	1	......	......	......	......	......	......	......
Alma	1, 182	6	......	......	......	......	......	......	......	......	......
Almond	1, 436	32	1	1	......	......	......	1	......	......	2
Amity	2, 216	29	......	......	......	......	......	......	......	......	......
Andover	1, 869	18	......	......	......	......	......	......	......	......	......
Angelica	1, 639	25	1	......	......	......	......	......	......	......	......

Belfast	1,574	24	......	1	......	......	......	......	......	......	......
Birdsall	634	7	......	......	......	......	......	......	......	......	......
Bolivar	2,085	24	......	......	......	......	......	......	......	......	......
Burns	1,424	21	......	......	......	......	......	......	......	......	......
Caneadea	1,310	18	......	1	......	......	......	......	......	......	......
Centerville	833	12	......	......	......	......	......	......	......	......	......
Clarksville	836	17	......	......	......	......	......	1	......	......	1
Cuba	2,369	45	......	2	......	......	......	4	......	......	1
Friendship	2,136	33	......	......	......	......	......	1	......	......	......
Genesee	1,052	6	......	......	......	......	......	......	......	......	......
Granger	800	12	......	......	......	......	......	......	......	......	......
Grove	812	19	......	......	......	......	......	......	......	......	1
Hume	1,749	25	......	......	......	......	......	......	1	......	2
Independence	1,280	4	......	......	......	......	......	......	......	......	......
New Hudson	926	11	......	......	......	......	......	......	......	......	1
Rushford	1,300	21	......	......	......	......	......	......	......	......	2
Scio	1,281	20	......	1	......	......	......	......	......	......	1
Ward	547	7	......	......	......	......	......	......	......	......	......
Wellsville	4,981	72	......	1	......	......	......	......	......	......	4
West Almond	601	5	......	......	......	......	......	......	......	......	......
Willing	1,246	4	......	......	......	......	......	......	......	......	......
Wirt	1,163	24	......	......	......	......	......	......	......	......	1
Broome county	69,149	1,080	1	5	1	3	2	5	9	22	76
BINGHAMTON	39,647	619	......	4	1	1	1	4	8	20	60
Barker	1,072	10	......	......	......	......	......	......	......	......	......
Binghamton	817	9	......	......	......	......	......	......	......	......	......
Chenango	1,372	23	......	......	......	......	......	......	......	......	1
Colesville	2,773	34	......	......	......	......	......	......	......	......	3
Conklin	946	23	......	......	......	......	1	......	1	......	......
Dickinson	728	26	1	......	......	......	......	......	......	1	1
Fenton	1,171	26	......	......	......	......	......	......	......	......	1
Kirkwood	918	8	......	......	......	......	......	......	......	......	1
Lisle	1,710	24	......	......	......	......	......	......	......	......	......
Maine	1,534	20	......	......	......	2	......	......	......	......	......
Nanticoke	666	8	......	......	......	......	......	......	......	......	......
Sanford	3,514	31	......	......	......	......	......	......	......	1	1

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Broome county—(*continued*)											
Triangle	1,727	30	......	......	......	......	......	......	......	......	2
Union	5,707	96	......	1	......	......	......	1	......	......	3
Vestal	1,850	16	......	......	......	......	......	......	......	......	1
Windsor	2,967	27	......	......	......	......	......	......	......	......	2
Cattaraugus county	65,643	770	2	8	......	4	......	5	2	8	22
OLEAN	9,612	99	1	3	......	2	......	......	1	3	4
Allegany	3,692	43	......	......	......	......	......	......	......	......	2
Ashford	1,645	15	......	......	......	......	......	......	......	......	......
Carrollton	2,035	11	......	......	......	1	......	......	......	......	......
Cold Spring	1,030	15	......	......	......	......	......	......	......	......	......
Conewango	1,224	12	......	......	......	......	......	1	......	......	......
Dayton	1,691	28	......	......	......	......	......	......	......	......	1
East Otto	1,188	5	......	......	......	......	......	......	......	......	......
Elko	571	5	......	1	......	......	......	......	......	......	......
Ellicottville	2,038	23	1	......	......	......	......	......	......	......	2
Farmersville	1,018	29	......	1	......	......	......	......	......	......	......
Franklinville	2,514	29	......	......	......	......	......	......	......	......	2
Freedom	1,209	10	......	1	......	......	......	......	......	......	......
Great Valley	1,697	17	......	......	......	......	......	......	......	......	......
Hinsdale	1,218	17	......	......	......	......	......	......	......	......	2
Humphrey	794	8	......	......	......	......	......	......	......	......	......
Ischua	832	18	......	......	......	......	......	......	......	......	......
Leon	1,068	9	......	......	......	......	......	......	......	1	......
Little Valley	1,616	23	......	1	......	......	......	......	......	1	1

Lyndon	609	4	......	......	......	......	......	......	......	......	......
Machias	1,557	31	......	......	......	......	......	......	......	......	......
Mansfield	968	6	......	......	......	......	......	1	......	......	......
Napoli	967	22	......	......	......	......	......	......	......	......	......
New Albion	2,872	21	......	......	......	......	......	......	......	......	......
Olean	4,854	64	......	......	......	1	......	......	......	......	......
Otto	1,105	14	......	......	......	......	......	1	......	......	......
Perrysburg	1,216	9	......	1	......	......	......	......	......	......	......
Persia	1,940	20	......	......	......	......	......	......	1	......	1
Portville	2,319	14	......	......	......	......	......	......	......	......	1
Randolph	2,605	32	......	......	......	......	......	......	......	......	1
Red House	973	9	......	......	......	......	......	......	......	......	......
Salamanca	4,251	72	......	......	......	......	......	2	......	2	4
Salamanca	923	8	......	......	......	......	......	......	......	......	......
South Valley	718	......	......	......	......	......	......	......	......	......	......
Yorkshire	1,738	38	......	......	......	......	......	......	......	1	1
Cayuga county	70,889	1,040	3	9	......	2	2	......	21	28	75
AUBURN	35,000	580	1	8	......	2	2	......	16	26	57
Aurelius	1,563	22	......	......	......	......	......	......	......	......	4
Brutus	2,582	40	1	......	......	......	......	......	......	......	1
Cato	1,624	18	......	......	......	......	......	......	......	......	2
Conquest	1,360	18	......	......	......	......	......	......	......	......	......
Fleming	1,076	22	......	......	......	......	......	......	1	......	......
Genoa	2,075	30	......	......	......	......	......	......	......	......	1
Ira	1,668	22	......	......	......	......	......	......	......	......	2
Ledyard	1,909	21	......	......	......	......	......	......	......	......	1
Locke	1,079	23	......	......	......	......	......	......	......	1	......
Mentz	1,914	23	1	......	......	......	......	......	......	......	1
Montezuma	991	11	......	......	......	......	......	......	......	......	......
Moravia	2,373	32	......	......	......	......	......	......	......	......	2
Niles	1,402	16	......	1	......	......	......	......	......	......	1
Owasco	1,331	27	......	......	......	......	......	......	1	......	......
Scipio	1,657	25	......	......	......	......	......	......	......	......	1
Sempronius	896	5	......	......	......	......	......	......	......	......	......
Sennett	1,440	42	......	......	......	......	......	......	......	......	1
Springport	1,770	16	......	......	......	......	......	......	......	......	......

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Cayuga county—(*continued*)											
Sterling	2,516	32									
Summer Hill	779	12							2		
Throop	1,038	23							1	1	
Venice	1,418	14									1
Victory	1,398	16									
Chautauqua county	**88,314**	**1,313**	**7**	**18**	**1**	**12**	**1**	**9**	**25**	**46**	**76**
DUNKIRK	11,616	237		4	1	9		5	6	20	12
JAMESTOWN	22,892	328		6		1	1	2	15	9	27
Arkright	918	10									
Busti	2,192	27							1		1
Carroll	1,684	22								2	
Charlotte	1,406	26								1	1
Chautauqua	3,590	77	2	1							7
Cherry Creek	1,745	26								1	1
Clymer	1,229	14				1					1
Dunkirk	454	1									
Ellery	1,628	26									2
Ellicott	3,118	37								1	2
Ellington	1,330	12									
Fredonia	4,127	75	2	1		1				8	6
French Creek	1,014	18									
Gerry	1,198	17									1
Hanover	4,778	60		1					1	1	4
Harmony	2,988	27									

Kiantone	491	7									
Mina	1,038	20		1					1		1
Poland	1,613	15						1			
Pomfret	2,186	23									
Portland	2,690	40	1	1				1			1
Ripley	2,256	28							1	1	1
Sheridan	1,633	16									1
Sherman	1,560	24									1
Stockton	1,852	26		1							1
Villanova	1,206	20									1
Westfield	1,452	11									
Westfield	2,430	48	2	2						2	4
Chemung county	**54,063**	**778**	**3**	**36**	**1**	**3**	**5**	**7**	**8**	**29**	**51**
ELMIRA	35,672	523	2	28	1	2	5	6	6	23	38
Ashland	954	14									
Baldwin	664	10									
Big Flats	1,705	25		2					1	1	
Catlin	1,109	14									1
Chemung	1,500	14									1
Elmira	1,260	28		1							2
Erin	996	12								1	1
Horseheads	4,944	56		4						4	4
Southport	2,201	37	1			1		1			
Van Etten	1,406	21									2
Veteran	1,652	24		1					1		2
Chenango county	**36,568**	**558**		**4**		**1**	**2**	**1**	**3**	**3**	**27**
Afton	1,920	29								1	2
Bainbridge	1,991	36							1		4
Columbus	997	9									
Coventry	987	19									
German	423	4									
Greene	3,152	56		1		1					1
Guilford	2,208	36									3
Lincklaen	646	11									
McDonough	907	10									

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Chenango county—(*continued*)											
New Berlin	2,525	27	......	1	......	......	......	......	......	......	2
North Norwich	801	12	......	......	......	......	......	......	......	......	1
Norwich	1,238	15	......	......	......	......	......	......	......	......	......
Norwich	5,766	98	......	......	......	......	2	1	2	1	5
Otselic	1,234	22	......	......	......	......	......	......	......	......	1
Oxford	3,545	57	......	......	......	......	......	......	......	......	1
Pharsalia	780	15	......	......	......	......	......	......	......	......	1
Pitcher	751	6	......	......	......	......	......	......	......	......	......
Plymouth	1,026	4	......	......	......	......	......	......	......	......	......
Preston	662	14	......	......	......	......	......	......	......	1	1
Sherburne	2,614	35	......	2	......	......	......	......	......	......	......
Smithville	1,105	15	......	......	......	......	......	......	......	......	1
Smyrna	1,290	28	......	......	......	......	......	......	......	......	4
Clinton county	47,430	508	6	6	......	......	6	1	5	25	50
Altona	2,465	11	......	......	......	......	......	......	......	......	......
Ausable	2,195	25	......	......	......	......	1	1	......	......	4
Beekmantown	2,067	35	......	......	......	......	1	......	......	1	1
Black Brook	1,933	24	......	......	......	......	......	......	......	......	3
Champlain	4,748	62	1	......	......	......	......	......	2	1	1
Chazy	2,796	34	......	......	......	......	......	......	1	1	1
Clinton	1,574	30	1	1	......	......	......	......	......	......	8
Dannemora	3,720	37	1	......	......	......	......	......	......	1	4
Ellenburg	3,248	15	......	2	......	......	......	......	......	......	......

Mooers	3,572	37	......	1	......	......	......	......	......	......	1
Peru	2,372	33	1	......	......	......	......	......	......	1	2
Plattsburg	3,178	19	......	......	......	......	......	......	......	......	1
Plattsburg	8,434	128	2	2	......	......	4	......	2	20	22
Saranac	3,463	19	......	......	......	......	......	......	......	......	2
Schuyler Falls	1,665	4	......	......	......	......	......	......	......	......	......
Columbia county	**43,211**	**704**	**2**	**6**	**2**	**1**	**5**	**2**	**6**	**6**	**46**
HUDSON	9,528	175	1	3	2	......	4	1	3	5	20
Ancram	1,238	15	......	......	......	......	......	......	......	......	......
Austerlitz	974	16	......	......	......	......	......	......	......	......	......
Canaan	1,307	19	......	......	......	......	......	......	......	......	......
Chatham	3,537	71	......	......	......	......	......	1	......	......	8
Claverack	4,416	72	......	......	......	1	1	......	......	......	5
Clermont	812	8	......	......	......	......	......	......	......	......	......
Copake	1,277	17	......	1	......	......	......	......	......	......	2
Gallatin	823	10	......	......	......	......	......	......	......	......	1
Germantown	1,686	19	......	1	......	......	......	......	......	......	......
Ghent	2,698	31	......	......	......	......	......	......	......	......	2
Greenport	1,191	19	......	......	......	......	......	......	......	......	1
Hillsdale	1,390	26	......	......	......	......	......	......	......	......	1
Kinderhook	3,333	71	1	......	......	......	......	......	......	......	7
Livingston	1,707	20	......	......	......	......	......	......	......	......	2
New Lebanon	1,556	30	......	1	......	......	......	......	......	......	......
Stockport	2,719	25	......	......	......	......	......	......	2	......	2
Stuyvesant	2,125	40	......	......	......	......	......	......	......	1	......
Taghkanick	894	20	......	......	......	......	......	......	1	......	......
Cortland county	**27,576**	**373**	**1**	**3**	......	......	......	**1**	**4**	**9**	**23**
Cincinnatus	912	9	......	......	......	......	......	......	......	......	......
Cortlandville	2,868	52	......	......	......	......	......	1	......	......	2
CORTLAND	9,014	113	......	......	......	......	......	......	2	2	11
Cuyler	991	11	......	......	......	......	......	......	......	......	2
Freetown	610	8	......	......	......	......	......	......	......	......	1
Harford	753	7	......	......	......	......	......	......	......	......	......
Homer	1,522	12	......	......	......	......	......	......	......	......	......
Homer	2,881	46	1	2	......	......	......	......	1	......	3

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Cortland county—(*continued*)											
Lapeer	538	5									
Marathon	1, 664	19									1
Preble	857	9									
Scott	852	12									1
Solon	622	13							1		1
Taylor	762	6									
Truxton	1, 217	22									
Virgil	1, 326	24		1							
Willett	687	9									
Delaware county	46, 413	489		5	2	1		2	1	5	30
Andes	1, 927	16								1	
Bovina	932	9									
Colchester	3, 156	41								2	
Davenport	1, 620	15								1	4
Delhi	3, 243	40									4
Deposit	1, 747	18								1	2
Franklin	2, 529	35				1			1		1
Hamden	1, 378	17									
Hancock	5, 308	32						1			1
Harpersfield	1, 221	9									
Kortwright	1, 475	14									1
Masonville	1, 245	16									
Meredith	1, 508	25		2							2
Middletown	3, 619	89						1			2

Roxbury	2,134	24	......	......	......	......	......	......	......	......	2
Sidney	4,023	36	......	......	......	......	......	......	......	......	4
Stamford	1,997	30	......	1	......	......	......	......	......	......	......
Tompkins	2,482	25	......	......	......	......	......	......	......	......	2
Walton	4,869	48	......	2	......	......	......	......	......	......	5
Dutchess county	81,670	1,361		18	3	6	7	4	8	3	122
POUGHKEEPSIE	24,029	462	......	11	2	5	2	2	5	13	42
Amenia	2,374	31	......	......	......	......	......	1	......	......	7
Beekman	1,071	16	......	......	......	......	......	......	......	......	......
Clinton	1,370	20	......	1	......	......	......	......	......	1	......
Dover	1,959	42	......	......	......	......	......	......	......	......	4
East Fishkill	1,970	34	......	......	......	......	1	1	1	......	......
Fishkill	13,016	220	......	3	......	......	2	......	......	15	23
Hyde Park	2,806	34	......	......	......	......	......	......	......	......	2
La Grange	1,301	31	......	......	......	......	......	......	1	......	3
Milan	950	12	......	......	......	......	......	......	......	......	......
North East	2,047	34	......	......	......	......	......	......	1	......	1
Pawling	1,921	23	......	......	......	......	......	......	......	......	2
Pine Plains	1,263	25	......	......	......	......	......	......	......	......	1
Pleasant Valley	1,483	23	......	......	......	......	......	......	......	......	3
Poughkeepsie	5,943	52	......	6	......	......	......	......	......	......	2
Red Hook	3,895	47	......	......	......	......	......	......	......	......	4
Rhinebeck	3,472	56	......	......	......	......	......	......	......	......	5
Stanford	1,624	27	......	......	......	......	......	......	......	......	4
Union Vale	945	22	......	......	......	......	......	......	......	......	2
Wappingers	1,692	33	......	1	......	......	......	......	......	......	1
Wappingers Falls	3,504	71	......	1	1	......	2	......	......	5	12
Washington	3,032	46	......	......	......	1	......	......	......	......	4
Erie county	451,299	6,914	37	146	1	28	38	59	139	400	516
BUFFALO	370,000	5,675	36	133	1	28	38	52	122	397	471
TONAWANDA	7,421	97	......	2	......	......	......	3	1	1	9
Alden	2,396	33	......	......	......	......	......	......	1	......	2
Amherst	4,293	51	......	......	......	......	......	2	2	......	3
Aurora	4,015	42	......	......	......	......	......	......	1	......	......
Boston	1,398	16	......	......	......	......	......	......	......	......	......

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Erie county—(*continued*)											
Brant	2,005	28	......	3	......	......	......	......	1	......	2
Cheektowaga	5,156	77	......	1	......	......	......	......	2	......	2
Clarence	2,948	18	......	......	......	......	......	......	......	......	2
Colden	1,260	15	......	......	......	......	......	......	......	......	2
Collins	3,753	67	......	2	......	......	......	1	2	3	3
Concord	4,086	64	......	......	......	......	......	......	......	1	1
East Hamburg	2,350	30	......	......	......	......	......	......	......	......	4
Eden	2,368	34	......	......	......	......	......	......	......	......	......
Elma	2,202	22	......	1	......	......	......	......	......	1	2
Evans	2,795	44	......	......	......	......	......	......	......	......	1
Grand Island	1,036	8	......	......	......	......	......	......	......	......	......
Hamburg	4,673	78	......	2	......	......	......	......	1	......	1
Holland	1,434	26	......	......	......	......	......	......	......	......	2
Lancaster	8,757	102	......	......	......	......	......	......	......	......	2
Marilla	1,441	21	......	......	......	......	......	......	......	1	......
Newstead	3,844	32	......	......	......	......	......	......	......	......	1
North Collins	2,362	27	......	......	......	......	......	......	......	......	2
Sardinia	1,548	24	......	......	......	......	......	......	......	......	1
Tonawanda	1,205	4	......	......	......	......	......	......	......	......	......
Wales	1,220	7	......	......	......	......	......	......	......	......	......
West Seneca	5,368	152	1	2	......	......	......	1	6	6	3
Essex county	**30,707**	**427**	......	**7**	......	**1**	**1**	**2**	**1**	**3**	**24**
Chesterfield	2,862	38	......	......	......	......	......	......	......	......	3
Crown Point	2,112	21	......	......	......	......	......	......	......	......	1
Elizabethtown	1,181	19	......	2	......	......	......	......	......	......	1

Essex	1,333	26	......	......	......	......	......	......	......	......	......
Jay	1,744	25	......	1	......	......	......	......	......	1	1
Keene	1,394	17	......	......	......	......	......	......	......	......	......
Lewis	1,123	14	......	1	......	......	......	......	......	......	......
Minerva	1,052	8	......	......	......	......	......	......	......	......	......
Moriah	4,447	77	......	1	......	......	......	......	......	......	4
Newcomb	507	5	......	......	......	......	......	......	......	......	1
North Elba	1,670	33	......	......	......	......	......	......	......	......	4
North Hudson	544	3	......	......	......	......	......	......	......	1	......
St. Armand	739	12	......	1	......	......	......	......	......	......	2
Schroon	1,272	23	......	......	......	......	1	1	......	......	1
Ticonderoga	5,048	62	......	1	......	......	......	......	1	1	3
Westport	1,727	22	......	......	......	......	......	......	......	......	2
Willsborough	1,522	17	......	......	......	......	......	1	......	......	1
Wilmington	634	5	......	......	......	1	......	......	......	......	......
Franklin county	**42,853**	**664**	1	**8**	......	**2**	......	**2**	**2**	**12**	**94**
Altamont	3,045	66	......	3	......	......	......	......	......	2	6
Bangor	2,221	23	......	......	......	......	......	......	......	......	......
Belmont	2,414	21	......	......	......	......	......	1	......	......	......
Bombay	2,742	82	......	......	......	......	......	......	1	......	4
Brandon	938	14	......	1	......	......	......	......	......	......	1
Brighton	706	15	......	......	......	......	......	......	......	......	2
Burke	1,936	17	......	......	......	......	......	......	......	......	3
Chateaugay	2,723	40	......	......	......	......	......	......	......	......	1
Constable	1,266	16	......	......	......	......	......	......	......	......	......
Dickinson	1,691	11	......	......	......	......	......	......	......	......	1
Duane	312	1	......	......	......	......	......	......	......	......	......
Fort Covington	2,043	29	......	......	......	......	......	......	1	......	3
Franklin	1,501	19	......	......	......	......	......	......	......	......	4
Harrietstown	1,142	24	......	......	......	......	......	......	......	1	1
Malone	5,935	81	......	......	......	1	......	1	......	5	12
Malone	4,074	60	......	......	......	......	......	......	......	3	2
Moira	2,484	31	......	......	......	......	......	......	......	1	......
Santa Clara	580	9	......	......	......	......	......	......	......	......	......
Saranac Lake	2,594	100	1	2	......	......	......	......	......	......	54
Waverly	1,615	33	......	1	......	1	......	......	......	......	1
Westville	1,237	22	......	1	......	......	......	......	......	......	......

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Fulton county	**42,842**	**626**	**3**	**5**	......	**2**	......	**8**	**4**	**16**	**38**
GLOVERSVILLE	18,349	285	2	2	......	......	......	4	2	11	17
Bleecker	603	11	......	......	......	......	......	......	......	......	......
Broadalbin	1,946	32	......	......	......	......	......	1	......	......	......
Caroga	470	17	......	......	......	......	......	......	......	......	1
Ephratah	1,566	21	......	......	......	......	......	......	......	......	......
JOHNSTOWN	10,130	156	1	3	......	1	......	3	1	5	16
Johnstown	2,661	22	......	......	......	......	......	......	......	......	1
Mayfield	2,136	26	......	......	......	......	......	......	1	......	......
Northampton	2,226	30	......	......	......	......	......	......	......	......	2
Oppenheim	1,258	10	......	......	......	......	......	......	......	......	......
Perth	667	8	......	......	......	1	......	......	......	......	......
Stratford	830	8	......	......	......	......	......	......	......	......	1
Genesee county	**34,561**	**499**	**1**	**10**	......	......	......	......	**4**	**9**	**30**
Alabama	1,957	23	......	......	......	......	......	......	......	......	3
Alexander	1,503	49	1	......	......	......	......	......	1	......	8
Batavia	9,180	125	......	6	......	......	......	......	1	6	7
Batavia	2,250	24	......	......	......	......	......	......	......	1	2
Bergen	1,669	31	......	......	......	......	......	......	......	......	......
Bethany	1,512	27	......	......	......	......	......	......	......	......	2
Byron	1,330	13	......	1	......	......	......	......	......	......	1
Darien	1,887	27	......	1	......	......	......	......	......	......	1
Elba	1,526	19	......	......	......	......	......	......	......	......	5
Le Roy	8,144	47	......	1	......	......	......	......	1	1	4
Le Roy	1,679	26	......	......	......	......	......	......	......	......	......

Oakfield	1,589	25						1	1	
Pavilion	1,542	17								
Pembroke	2,425	35		1						2
Stafford	1,338	11								
Greene county	**31,478**	**534**	**3**	**10**			**2**	**4**	**11**	**35**
Ashland	692	14								
Athens	2,891	41						1		2
Cairo	2,176	59								2
Catskill	3,082	43	1						1	1
Catskill	5,484	88		2				1	5	7
Coxsackie	4,102	92	1	4			2		5	9
Durham	1,636	25						1		3
Greenville	1,651	32		1						3
Halcott	350	8								
Hunter	2,788	39		2				1		3
Jewett	1,028	14		1						1
Lexington	1,153	22	1							
New Baltimore	2,283	31								2
Prattsville	775	8								1
Windham	1,387	18								1
Hamilton county	**4,947**	**43**						**1**		**2**
Arietta	247									
Benson	299	7								
Hope	463	2								
Indian Lake	1,219	14						1		1
Inlet		2								1
Lake Pleasant	469	5								
Long Lake	1,023	4								
Morehouse	319	2								
Wells	908	7								
Herkimer county	**51,049**	**700**	**8**	**6**		**1**	**16**	**9**	**13**	**44**
Columbia	1,268	17								
Danube	1,043	11								
Fairfield	1,390	10								

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Herkimer county—(*continued*)											
Frankfort	4,472	57	......	......	......	......	......	......	......	......	1
German Flats	3,525	52	......	......	......	......	......	......	......	4	3
Ilion	5,138	78	5	1	......	......	......	5	......	1	10
Herkimer	5,555	68	......	......	......	......	......	3	1	4	8
Herkimer	1,193	11	......	......	......	......	......	......	......	......	1
Litchfield	931	9	......	......	......	......	......	......	1	......	......
LITTLE FALLS	10,381	117	1	3	......	......	1	4	2	1	10
Little Falls	718	10	......	......	......	......	......	......	......	......	......
Manheim	2,648	31	......	1	......	......	......	......	......	......	2
Newport	1,613	45	1	......	......	......	......	1	......	1	1
Norway	680	10	......	1	......	......	......	1	......	......	......
Ohio	660	8	......	......	......	......	......	......	......	......	......
Russia	2,025	32	......	......	......	......	......	1	......	......	2
Salisbury	1,426	24	1	......	......	......	......	......	......	......	......
Schuyler	1,365	17	......	......	......	......	......	1	......	......	......
Stark	1,030	14	......	......	......	......	......	......	......	......	1
Warren	1,240	30	......	......	......	......	......	......	3	......	1
Webb	920	19	......	......	......	......	......	......	2	1	4
Wilmurt	353	3	......	......	......	......	......	......	......	......	......
Winfield	1,475	27	......	......	......	......	......	......	......	1	......
Jefferson county	76,748	1,062	4	23	......	1	......	1	20	24	72
WATERTOWN	21,696	356	3	17	......	1	......	......	12	19	25
Adams	3,081	49	......	......	......	......	......	......	1	1	2
Alexandria	3,894	49	1	......	......	......	......	......	1	......	3

Antwerp	3,008	37	...	...	...	...	...	...	...	1	...
Brownville	3,698	39	...	1	...	...	...	...	...	1	2
Cape Vincent	2,882	36	...	2	...	...	...	...	1	...	1
Champion	2,525	35	...	...	...	...	...	...	...	...	3
Clayton	4,313	59	...	...	...	...	...	...	1	...	9
Ellisburg	3,888	55	...	1	...	...	...	...	3	...	5
Henderson	1,615	22	...	...	...	...	...	...	...	...	1
Hounsfield	2,772	27	...	...	...	...	...	...	...	...	2
Le Ray	2,576	32	...	...	...	...	...	...	...	...	...
Lorraine	1,019	14	...	...	...	...	...	...	...	...	1
Lyme	2,200	24	...	...	...	...	...	...	...	...	4
Orleans	2,367	27	...	...	...	...	...	...	...	...	...
Pamelia	1,031	24	...	...	...	...	...	...	...	...	1
Philadelphia	1,750	30	...	1	...	...	...	...	...	...	1
Rodman	1,212	7	...	...	...	...	...	...	...	...	1
Rutland	1,885	29	...	...	...	...	...	1	1	...	3
Theresa	2,130	29	...	...	...	...	...	...	...	1	2
Watertown	1,159	20	...	...	...	...	...	...	...	1	2
Wilna	5,172	62	...	1	...	...	...	...	...	...	3
Worth	875	10	...	...	...	...	...	...	...	...	1
Kings county*	...	...	...	...	...	...	...	...	...	...	...
Lewis county	27,427	374	2	6	1	...	...	1	5	3	16
Croghan	3,159	34	...	...	...	...	...	...	...	1	2
Denmark	2,193	29	1	...	...	...	...	...	1	...	...
Diana	2,083	34	...	1	...	...	...	...	...	...	...
Greig	1,100	6	...	...	...	...	...	...	...	...	1
Harrisburg	770	12	...	...	...	...	...	...	...	...	...
High Market	598	13	...	1	...	...	...	...	...	...	...
Lewis	917	6	...	...	...	...	...	...	...	...	...
Leyden	1,629	31	...	1	...	...	...	...	...	...	3
Lowville	3,746	67	...	1	1	...	...	...	...	1	3
Lyonsdale	1,871	17	...	...	...	...	...	...	3	...	1
Martinsburg	1,845	26	...	...	...	...	...	...	...	...	4
Montague	766	7	...	...	...	...	...	...	...	1	...
New Bremen	1,775	22	...	...	...	...	...	...	...	...	...

* See the City of New York

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Lewis county—(*continued*)											
Osceola	629	8									1
Pinckney	934	9									
Turin	1,157	11	1								
Watson	981	14		1							
West Turin	1,779	28		1				1	1		1
Livingston county	**37,059**	**556**	**1**	**2**			**4**		**3**	**3**	**25**
Avon	3,071	40							1		2
Caledonia	2,072	27									2
Conesus	1,149	14									1
Geneseo	3,613	66									5
Groveland	1,949	62									5
Leicester	1,415	22							1		1
Lima	2,279	29									1
Livonia	2,788	25									
Mt. Morris	3,715	58	1	1							1
North Dansville	328	6									
Dansville	3,633	68					2			2	2
Nunda	2,397	48		1			1				2
Ossian	780	5									
Portage	1,029	18									1
Sparta	1,189	9					1				
Springwater	2,016	17									1
West Sparta	906	12									
York	2,730	30							1	1	1

Madison county	**42,096**	**540**	**1**	**2**	......	**1**	......	**2**	**4**	**2**	**22**
Brookfield	2,726	33	......	1	......	......	......	......	......	1	......
Cazenovia	3,830	57	......	......	......	......	......	......	......	......	5
De Ruyter	1,410	21	1	......	......	......	......	......	......	......	......
Eaton	2,705	44	......	......	......	......	......	......	......	......	......
Fenner	911	10	......	......	......	......	......	......	......	......	......
Georgetown	998	16	......	......	......	......	......	......	......	......	1
Hamilton	3,741	58	......	1	......	1	......	......	......	1	2
Lebanon	1,243	13	......	......	......	......	......	......	......	......	......
Lenox	4,679	24	......	......	......	......	......	......	......	......	......
Lincoln	1,052	14	......	......	......	......	......	......	......	......	......
ONEIDA	7,942	111	......	......	......	......	......	1	4	......	7
Oneida	1,174	3	......	......	......	......	......	......	......	......	......
Madison	2,024	28	......	......	......	......	......	......	......	......	......
Nelson	1,296	18	......	......	......	......	......	......	......	......	1
Smithfield	989	12	......	......	......	......	......	......	......	......	2
Stockbridge	1,622	21	......	......	......	......	......	......	......	......	1
Sullivan	3,778	57	......	......	......	......	......	1	......	......	3
Monroe county	**217,854**	**3,287**	**9**	**25**	**1**	**12**	**25**	**22**	**128**	**105**	**259**
ROCHESTER	162,608	2,527	6	21	......	11	24	14	114	101	225
Brighton	3,815	46	......	1	......	......	......	3	......	......	4
Chili	2,099	25	......	......	......	......	......	1	......	......	......
Clarkson	1,581	27	......	1	......	......	......	......	......	1	2
Gates	3,468	45	......	......	......	......	......	......	2	......	2
Greece	5,579	63	......	......	......	......	......	......	......	......	2
Hamlin	2,188	57	......	......	......	1	1	......	6	......	5
Henrietta	2,062	18	......	......	......	......	......	......	......	......	......
Irondequoit	2,863	36	......	......	......	......	......	......	......	1	2
Mendon	2,760	33	......	......	......	......	......	......	......	......	4
Ogden	2,616	36	......	......	......	......	......	......	......	......	2
Parma	2,814	27	......	......	......	......	......	......	......	......	......
Penfield	2,857	40	......	......	......	......	......	2	......	......	1
Perinton	4,703	73	1	......	......	......	......	2	2	......	3
Pittsford	2,373	37	......	......	......	......	......	......	1	......	1
Riga	1,864	30	......	......	......	......	......	......	1	......	......

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Monroe county—(*continued*)											
Rush	1,491	17	1	......	......	......	......	......	......	......	......
Sweden	1,345	17	......	......	......	......	......	......	......	......	......
Brockport	3,398	57	1	2	......	......	......	......	2	2	4
Webster	3,289	40	......	......	1	......	......	......	......	......	2
Wheatland	2,071	36	......	......	......	......	......	......	......	......	......
Montgomery county	47,488	771	1	13	1	28	9	6	7	23	54
AMSTERDAM	20,929	394	......	10	......	26	2	6	5	22	31
Amsterdam	3,202	28	......	......	......	1	......	......	1	......	1
Canajoharie	3,888	69	1	2	......	......	......	......	......	1	5
Charleston	1,052	18	......	......	......	......	......	......	......	......	2
Florida	1,988	23	......	......	......	......	4	......	1	......	......
Glen	2,281	26	......	......	......	......	3	......	......	......	2
Minden	2,097	30	......	......	......	......	......	......	......	......	......
Fort Plain	2,444	44	......	......	1	......	......	......	......	......	5
Mohawk	2,711	40	......	1	......	1	......	......	......	......	2
Palatine	2,569	41	......	......	......	......	......	......	......	......	4
Root	1,653	16	......	......	......	......	......	......	......	......	1
St. Johnsville	2,674	42	......	......	......	......	......	......	......	......	1
Nassau county	55,448	853	1	4	1	4	2	4	19	40	74
Hempstead	27,066	387	......	1	1	2	2	3	11	18	28
North Hempstead	12,048	207	......	2	......	1	......	......	8	10	18
Oyster Bay	16,334	259	1	1	......	1	......	1	5	12	28

New York, City of	**3,437,202**	**67,808**	**255**	**634**	**90**	**737**	**506**	**334**	**2,185**	**5,190**	**7,990**
Borough of Manhattan	1,850,093	37,019	175	299	27	292	276	166	1,077	2,792	3,973
Borough of Bronx	200,507	4,773	18	33	12	174	45	21	155	238	1,291
Borough of Brooklyn	1,166,582	22,092	57	267	36	244	167	118	830	1,724	2,385
Borough of Queens	152,999	2,706	5	21	11	24	15	22	100	300	212
Borough of Richmond	67,021	1,218	......	14	4	3	3	7	23	136	129
Niagara county	**74,961**	**1,193**	**2**	**53**	......	**24**	......	**6**	**22**	**47**	**79**
LOCKPORT	16,581	283	......	13	......	2	......	2	15	13	22
NIAGARA FALLS	19,457	372	......	27	......	20	......	2	3	29	24
Cambria	1,880	24	......	......	......	1	......	......	......	......	......
Hartland	2,728	47	1	......	......	1	......	......	1	......	4
Lewiston	3,221	65	......	1	......	......	......	......	......	......	6
Lockport	2,585	35	......	1	......	......	......	......	......	......	2
Newfane	3,248	41	......	1	......	......	......	......	1	3	3
Niagara	1,066	14	......	......	......	......	......	......	......	......	......
Pendleton	1,364	13	......	......	......	......	......	......	......	......	......
Porter	2,235	27	......	2	......	......	......	......	......	......	......
Royalton	4,797	66	......	1	......	......	......	......	1	......	5
Somerset	1,923	26	......	1	......	......	......	......	......	......	1
Wheatfield	1,926	25	......	1	......	......	......	......	......	......	2
NORTH TONAWANDA	9,069	106	1	4	......	......	......	1	1	2	6
Wilson	2,881	49	......	1	......	......	......	1	......	......	4
Oneida county	**132,800**	**2,127**	**9**	**18**	......	**5**	......	**11**	**35**	**66**	**165**
UTICA	56,383	1,049	7	10	......	3	......	7	30	51	101
ROME	15,243	281	1	3	......	1	......	3	1	7	23
Annsville	1,744	21	......	......	......	......	......	......	......	......	......
Augusta	2,029	20	......	......	......	......	......	......	......	......	1
Ava	706	6	......	......	......	......	......	......	......	......	......
Boonville	3,332	56	......	......	......	......	......	......	1	......	3
Bridgewater	931	15	......	......	......	......	......	......	......	......	1
Camden	3,745	47	......	1	......	......	......	......	......	......	3
Deerfield	1,756	25	......	......	......	1	......	......	......	......	1
Florence	1,207	19	......	......	......	......	......	......	......	1	1
Floyd	785	9	......	......	......	......	......	......	......	......	1
Forestport	1,562	22	......	......	......	......	......	......	......	......	2

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Oneida county—(*continued*)											
Kirkland	4,545	69	.....	1	.....	.....	.....	.....	.....	.....	1
Lee	1,571	23	.....	.....	.....	.....	.....	.....	.....	1	1
Marcy	1,398	20	.....	.....	.....	.....	.....	1	.....	.....	2
Marshall	1,566	19	1	.....	.....	.....	.....	.....	.....	.....	1
New Hartford	5,230	55	.....	.....	.....	.....	.....	.....	.....	.....	5
Paris	2,626	39	.....	.....	.....	.....	.....	.....	1	.....	1
Remsen	1,208	26	.....	.....	.....	.....	.....	.....	.....	.....	1
Rome	.....	12	.....	.....	.....	.....	.....	.....	.....	.....	1
Sangerfield	1,107	29	.....	2	.....	.....	.....	.....	.....	.....	2
Steuben	902	9	.....	.....	.....	.....	.....	.....	.....	.....	.....
Trenton	2,628	31	.....	1	.....	.....	.....	.....	2	.....	2
Vernon	2,784	40	.....	.....	.....	.....	.....	.....	.....	1	.....
Verona	3,875	42	.....	.....	.....	.....	.....	.....	.....	.....	2
Vienna	2,218	23	.....	.....	.....	.....	.....	.....	.....	1	2
Waterville	1,571	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Western	1,621	17	.....	.....	.....	.....	.....	.....	.....	.....	.....
Westmoreland	2,192	27	.....	.....	.....	.....	.....	.....	.....	1	2
Whitestown	6,235	75	.....	.....	.....	.....	.....	.....	.....	3	5
Onondaga county	**168,735**	**2,497**	**11**	**30**	.....	**4**	**15**	**34**	**24**	**77**	**198**
SYRACUSE	108,374	1,607	7	18	.....	2	10	21	22	73	142
Camillus	2,543	22	.....	.....	.....	2	.....	1	.....	.....	1
Cicero	2,611	37	.....	.....	.....	.....	.....	.....	.....	.....	.....
Clay	2,578	40	.....	1	.....	.....	.....	1	1	.....	2
De Witt	5,435	91	1	7	.....	.....	.....	2	1	1	5

Elbridge	3,327	46	.....	.....	.....	.....	.....	.....	.....	.....	1
Fabius	1,686	27	1	.....	.....	.....	.....	1	.....	.....	1
Geddes	4,387	53	.....	.....	.....	.....	2	2	.....	1	4
La Fayette	1,892	37	.....	1	.....	.....	.....	.....	.....	.....	.....
Lysander	3,026	32	.....	1	.....	.....	.....	.....	.....	.....	4
Baldwinsville	2,992	34	.....	.....	.....	.....	1	1	.....	.....	2
Manlius	5,374	95	1	.....	.....	.....	2	1	.....	.....	5
Marcellus	2,581	21	.....	.....	.....	.....	.....	.....	.....	1	2
Onondaga	5,580	144	1	.....	.....	.....	.....	.....	.....	.....	17
Otisco	1,202	26	.....	1	.....	.....	.....	.....	.....	.....	1
Pompey	2,546	32	.....	1	.....	.....	.....	1	.....	.....	.....
Salina	3,745	43	.....	.....	.....	.....	.....	2	.....	1	5
Skaneateles	4,205	52	.....	.....	.....	.....	.....	1	.....	.....	3
Spafford	1,159	15	.....	.....	.....	.....	.....	.....	.....	.....	1
Tully	1,465	20	.....	.....	.....	.....	.....	.....	.....	.....	1
Van Buren	2,117	23	.....	.....	.....	.....	.....	.....	.....	.....	1
Ontario county	**49,605**	**760**	**3**	**14**	.....	**1**	**2**	.....	**4**	**17**	**56**
Bristol	1,310	15	.....	.....	.....	.....	.....	.....	.....	.....	1
Canadice	674	11	.....	.....	.....	.....	.....	.....	.....	.....	1
Canandaigua	2,133	11	.....	.....	.....	.....	.....	.....	.....	.....	.....
Canandaigua	6,151	137	1	2	.....	.....	.....	.....	1	6	9
East Bloomfield	1,940	38	.....	.....	.....	.....	.....	.....	.....	.....	3
Farmington	1,607	30	.....	.....	.....	.....	.....	.....	.....	.....	.....
Geneva	1,091	12	.....	.....	.....	.....	.....	.....	.....	.....	1
GENEVA	10,433	174	2	6	.....	.....	2	.....	.....	2	14
Gorham	2,131	26	.....	.....	.....	.....	.....	.....	.....	.....	1
Hopewell	1,550	28	.....	.....	.....	.....	.....	.....	.....	.....	2
Manchester	4,783	81	.....	1	.....	1	.....	.....	.....	6	7
Naples	2,370	20	.....	1	.....	.....	.....	.....	.....	1	.....
Phelps	4,788	55	.....	1	.....	.....	.....	.....	3	1	6
Richmond	1,381	22	.....	.....	.....	.....	.....	.....	.....	.....	3
Seneca	2,654	36	.....	.....	.....	.....	.....	.....	.....	.....	3
South Bristol	1,104	12	.....	2	.....	.....	.....	.....	.....	1	.....
Victor	2,249	34	.....	.....	.....	.....	.....	.....	.....	.....	3
West Bloomfield	1,306	18	.....	1	.....	.....	.....	.....	.....	.....	2

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Orange county	103,859	1,684	8	28	......	2	......	12	21	48	161
NEWBURGH	24,943	469	2	9	......	2	......	2	6	25	64
MIDDLETOWN	14,522	225	2	2	......	......	......	2	3	4	18
Blooming Grove	2,188	26	1	......	......	......	......	......	......	......	1
Chester	2,186	43	......	......	......	......	......	......	1	......	2
Cornwall	4,258	65	......	......	......	......	......	......	......	1	3
Crawford	1,778	24	......	......	......	......	......	......	......	......	1
Deerpark	1,932	45	......	1	......	......	......	......	......	......	......
Port Jervis	9,385	165	......	7	......	......	......	3	2	7	23
Goshen	4,564	98	......	2	......	......	......	2	......	3	9
Greenville	800	7	......	......	......	......	......	......	......	......	......
Hamptonburg	1,072	15	......	......	......	......	......	......	......	......	......
Highlands	4,519	56	......	......	......	......	......	......	1	......	3
Minisink	1,505	21	......	......	......	......	......	......	......	......	2
Monroe	1,784	52	2	1	......	......	......	......	......	......	7
Montgomery	5,939	98	......	1	......	......	......	......	5	4	13
Mount Hope	1,236	19	......	......	......	......	......	......	1	......	1
Newburgh	4,246	36	......	1	......	......	......	......	......	1	2
New Windsor	2,392	31	......	......	......	......	......	1	1	......	2
Tuxedo	2,277	24	......	......	......	......	......	......	......	......	......
Walkill	2,725	28	......	......	......	......	......	......	......	......	2
Warwick	6,403	102	1	4	......	......	......	2	1	8	8
Wawayanda	1,539	14	......	......	......	......	......	......	......	......	......
Woodbury	1,666	21	......	......	......	......	......	......	......	......	......

Orleans county	30,164	432		5					3	6	21
Albion	4,447	74		1					1	2	6
Albion	1,398	23							1		1
Barre	1,937	19									1
Carlton	2,838	27								1	
Clarendon	1,518	17									
Gaines	1,763	30									
Kendall	1,616	33		1					1	1	1
Murray	3,656	57		1							3
Ridgeway	2,753	35									2
Medina	4,716	57								2	7
Shelby	2,108	31									
Yates	1,884	29		2							
Oswego county	70,881	1,089	4	24		3	4	12	18	16	64
OSWEGO	22,199	324	1	12			2	7	12	12	23
Albion	1,724	37	1						1		1
Amboy	824	11							1		1
Boylston	849	9									
Constantia	2,259	36						1			3
Granby	5,120	37									6
Hannibal	2,473	32		1							1
Hastings	2,303	34	1					1			1
Mexico	3,091	52									4
New Haven	1,408	16									1
Orwell	1,149	15									
Oswego	2,737	45		1			1		1		1
Palermo	1,407	17									1
Parish	1,530	28									2
Redfield	911	7									1
Richland	3,535	45		1							4
Sandy Creek	2,232	39								1	
Schroeppel	3,012	44		1					2		2
Scriba	2,480	44				3					1
Volney	2,393	44					1				1
Fulton	5,281	145	1	8				3	1	3	9
West Monroe	936	14									1
Williamstown	1,028	14									

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Otsego county	48,939	774	1	8	......	4	......	4	4	9	29
Burlington	1,263	21	......	......	......	......	......	......	......	......	......
Butternuts	1,698	31	......	......	......	......	......	......	......	......	1
Cherry Valley	1,802	24	......	......	......	......	......	......	......	......	1
Decatur	559	11	......	......	......	......	......	......	......	1	......
Edmeston	1,767	21	......	......	......	......	......	......	......	......	2
Exeter	1,087	18	......	......	......	......	......	......	......	......	2
Hartwick	1,800	30	......	1	......	......	......	......	......	......	2
Laurens	1,483	20	......	......	......	......	......	......	......	......	1
Maryland	1,998	31	......	......	......	3	......	......	......	......	1
Middlefield	2,058	35	......	......	......	......	......	......	......	1	1
Milford	2,007	22	......	......	......	......	......	......	1	......	......
Morris	1,689	36	......	......	......	......	......	......	......	......	1
New Lisbon	1,225	20	......	......	......	......	......	......	......	......	1
Oneonta	1,763	22	......	......	......	......	......	......	......	1	......
Oneonta	7,147	110	1	2	......	......	......	2	......	3	3
Otego	1,817	37	......	1	......	......	......	1	......	......	1
Otsego	1,171	28	......	......	......	......	......	......	......	......	1
Cooperstown	2,368	47	......	2	......	......	......	......	......	2	2
Pittsfield	1,101	18	......	......	......	......	......	......	......	......	......
Plainfield	897	15	......	......	......	......	......	......	......	......	2
Richfield	2,526	28	......	......	......	......	......	......	......	......	1
Roseboom	1,031	16	......	......	......	......	......	......	1	......	......
Springfield	1,762	26	......	......	......	......	......	......	......	......	1
Unadilla	2,601	36	......	......	......	......	......	......	......	......	1
Westford	910	28	......	1	......	......	......	1	1	......	1
Worcester	2,409	43	......	1	......	1	......	......	1	1	3

Putnam county	13,787	197	......	......	......	......	......	......	......	......	10
Carmel	2,598	34	......	......	......	......	......	......	......	......	3
Kent	1,026	16	......	......	......	......	......	......	......	......	......
Patterson	1,644	22	......	......	......	......	......	......	......	......	1
Phillipstown	4,642	76	......	......	......	......	......	......	......	......	4
Putnam Valley	1,034	16	......	......	......	......	......	......	......	......	......
South East	2,843	33	......	......	......	......	......	......	......	......	2
Rensselaer county	121,697	2,166	7	32	......	4	1	13	29	57	250
TROY	60,651	1,450	5	25	......	4	......	6	23	43	206
Berlin	1,677	26	......	2	......	......	......	......	......	1	1
Brunswick	3,513	42	......	......	......	......	......	......	......	......	2
East Greenbush	2,036	19	......	......	......	......	......	......	......	......	1
Grafton	1,136	7	......	......	......	......	......	......	......	......	1
RENSSELAER	7,466	168	1	3	......	......	......	4	2	7	18
Hoosick	2,960	45	1	......	......	......	......	......	1	......	5
Hoosick Falls	5,671	94	......	......	......	......	......	2	......	6	4
Nassau	2,073	33	......	......	......	......	......	......	1	......	1
North Greenbush	4,719	13	......	......	......	......	......	......	......	......	......
Petersburg	1,449	23	......	......	......	......	......	......	......	......	2
Pittstown	3,236	44	......	......	......	......	......	......	1	......	4
Poestenkill	1,342	28	......	......	......	......	......	......	......	......	......
Sand Lake	2,299	24	......	......	......	......	......	......	......	......	2
Schaghticoke	2,631	46	......	......	......	......	......	......	......	......	1
Schodack	4,334	77	......	2	......	......	......	......	1	......	......
Stephentown	1,545	27	......	......	......	......	1	1	......	......	2
Richmond county*	......	......	......	......	......	......	......	......	......	......	......
Rockland county	38,298	555	1	3	3	......	3	4	9	6	58
Clarkstown	6,305	67	......	......	......	......	......	......	......	......	4
Haverstraw	9,874	120	......	1	3	......	......	2	2	2	15
Orangetown	6,181	89	1	......	......	......	2	1	2	1	10
Nyack	4,275	72	......	......	......	......	1	......	......	......	9
Ramapo	7,502	150	......	1	......	......	......	1	5	3	20
Stony Point	4,161	57	......	1	......	......	......	......	......	......	......

* See the City of New York

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
St. Lawrence county	89, 083	1, 150	6	31	......	3	3	5	8	34	78
OGDENSBURG	12, 633	233	4	8	......	3	......	......	......	14	26
Brasher	2, 703	26	......	......	......	......	......	......	......	......	3
Canton	6, 387	93	......	5	......	......	......	1	......	2	6
Clare	330	3	......	......	......	......	......	......	......	......	......
Clifton	1, 382	12	......	......	......	......	......	......	1	2	......
Colton	1, 678	25	......	1	......	......	......	1	......	1	2
De Kalb	2, 723	20	......	......	......	......	......	......	......	......	......
De Peyster	936	4	......	......	......	......	......	1	......	......	......
Edwards	1, 340	25	......	1	......	......	......	......	1	......	......
Fine	1, 694	31	1	......	......	......	......	......	......	......	1
Fowler	1, 716	21	......	......	......	......	......	......	......	......	......
Gouverneur	5, 915	85	1	5	......	......	3	2	......	7	7
Hammond	1, 764	24	......	2	......	......	......	......	......	......	......
Hermon	1, 542	27	......	......	......	......	......	......	......	......	1
Hopkinton	2, 521	15	......	......	......	......	......	......	......	1	2
Lawrence	1, 963	25	......	......	......	......	......	......	......	1	......
Lisbon	5, 255	35	......	......	......	......	......	......	......	......	......
Louisville	1, 621	19	......	......	......	......	......	......	......	2	1
Macomb	1, 874	11	......	......	......	......	......	......	......	......	2
Madrid	1, 668	24	......	......	......	......	......	......	......	......	......
Massena	3, 904	41	......	2	......	......	......	......	......	......	1
Morristown	1, 798	30	......	......	......	......	......	......	5	......	......
Norfolk	1, 911	28	......	2	......	......	......	......	......	......	2
Oswegatchie	2, 368	27	......	......	......	......	......	......	1	......	......

Parishville	2,086	23	......	2	......	......	......	......	......	......	......
Piercefield	......	11	......	......	......	......	......	......	......	......	1
Pierrepont	1,885	21	......	......	......	......	......	......	......	......	1
Pitcairn	902	16	......	......	......	......	......	......	......	......	1
Potsdam	5,211	52	......	2	......	......	......	......	......	......	6
Potsdam	3,843	43	......	1	......	......	......	......	......	2	8
Rossie	1,136	27	......	......	......	......	......	......	......	......	2
Russell	2,067	26	......	......	......	......	......	......	......	......	2
Stockholm	2,826	21	......	......	......	......	......	......	......	2	1
Waddington	2,001	25	......	......	......	......	......	......	......	......	2
Saratoga county	**61,089**	**1,002**	**2**	**16**	......	**5**	**1**	**12**	**7**	**18**	**90**
Ballston Spa	8,923	39	......	......	......	......	......	......	1	1	4
Ballston	1,501	19	......	......	......	......	......	2	......	......	......
Charlton	1,109	14	......	......	......	......	......	1	......	......	......
Clifton Park	2,140	28	......	......	......	1	......	......	......	......	1
Corinth	3,104	40	......	1	......	......	......	......	1	......	3
Day	719	7	......	......	......	......	......	......	......	......	......
Edinburg	1,032	8	......	......	......	......	......	......	......	......	......
Galway	1,350	31	......	......	......	......	......	......	......	......	2
Greenfield	1,837	21	......	......	......	......	......	......	......	......	1
Hadley	914	14	......	......	......	......	......	1	......	......	2
Halfmoon	1,906	25	......	1	......	......	......	......	......	......	2
Malta	1,322	17	......	......	......	......	......	......	......	......	1
Mechanicville	4,695	68	1	2	......	......	......	......	1	3	8
Milton	2,536	72	1	......	......	1	1	......	......	1	6
Moreau	2,999	53	......	1	......	......	......	......	......	1	5
Northumberland	1,227	15	......	......	......	......	......	......	......	......	1
Providence	607	21	......	......	......	3	......	1	......	......	......
Saratoga	3,999	73	......	......	......	......	......	1	......	......	8
Saratoga Springs	1,125	20	......	......	......	......	......	......	......	......	2
Saratoga Springs	12,409	257	......	5	......	......	......	4	4	10	27
Stillwater	3,489	40	......	3	......	......	......	......	......	1	2
Waterford	6,157	98	......	3	......	......	......	2	......	1	13
Wilton	989	22	......	......	......	......	......	......	......	......	1

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Schenectady county	**62,795**	**960**	**2**	**20**	......	**12**	**13**	**9**	**22**	**94**	**86**
SCHENECTADY	47,625	796	2	16	......	11	13	9	21	93	76
Duanesburg	2,428	40	......	......	......	......	......	......	......	......	2
Glenville	3,010	56	......	3	......	......	......	......	1	......	4
Niskayuna	1,327	11	......	......	......	......	......	......	......	......	......
Princetown	694	10	......	......	......	1	......	......	......	......	4
Rotterdam	7,711	47	......	1	......	......	......	......	......	1	......
Schoharie county	**26,854**	**436**	**2**	**8**	......	......	**1**	**2**	**2**	**8**	**22**
Blenheim	768	17	......	......	......	......	......	......	......	......	......
Broome	1,153	22	......	......	......	......	......	......	......	......	......
Carlisle	1,225	14	......	......	......	......	......	......	......	......	1
Cobleskill	3,973	59	......	1	......	......	......	2	......	3	6
Conesville	793	17	1	......	......	......	......	......	......	......	2
Esperance	1,096	16	......	......	......	......	......	......	......	......	1
Fulton	1,998	30	......	2	......	......	......	......	......	......	2
Gilboa	1,448	20	......	......	......	......	......	......	......	......	2
Jefferson	1,409	19	......	......	......	......	......	......	......	......	1
Middleburg	2,738	42	......	1	......	......	......	......	1	1	4
Richmondville	1,719	31	1	......	......	......	......	......	......	......	......
Schoharie	2,900	44	......	......	......	......	......	......	......	2	2
Seward	1,404	28	......	2	......	......	......	......	1	1	......
Sharon	2,058	38	......	2	......	......	......	......	......	......	1
Summit	1,217	19	......	......	......	......	......	......	......	......	......
Wright	1,155	20	......	......	......	......	1	......	......	......	......

Schuyler county	**15,811**	**196**	......	......	......	......	......	......	**1**	**1**	**4**
Catherine	1,386	16	......	......	......	......	......	......	......	......	......
Cayuta	459	5	......	......	......	......	......	......	......	......	......
Dix	3,894	54	......	......	......	......	......	......	......	......	1
Hector	4,137	52	......	......	......	......	......	......	......	1	2
Montour	1,623	22	......	......	......	......	......	......	1	......	1
Orange	1,391	19	......	......	......	......	......	......	......	......	......
Reading	1,335	13	......	......	......	......	......	......	......	......	......
Tyrone	1,586	15	......	......	......	......	......	......	......	......	......
Seneca county	**28,114**	**393**	......	**3**	......	......	......	**1**	**2**	**7**	**28**
Covert	1,897	30	......	1	......	......	......	......	......	......	1
Fayette	2,056	34	......	......	......	......	......	......	......	......	2
Lodi	1,636	32	......	......	......	......	......	......	......	......	3
Ovid	3,734	36	......	......	......	......	......	......	......	......	1
Romulus	2,895	51	......	1	......	......	......	......	......	4	5
Seneca Falls	786	8	......	......	......	......	......	......	......	......	......
Seneca Falls	6,519	102	......	......	......	......	......	......	2	3	10
Tyre	954	18	......	......	......	......	......	......	......	......	1
Varick	1,270	16	......	......	......	......	......	......	......	......	1
Waterloo	1,058	6	......	......	......	......	......	......	......	......	......
Waterloo	4,256	60	......	1	......	......	......	1	......	......	4
Steuben county	**82,822**	**1,030**	**5**	**16**	......	**1**	**3**	**7**	**15**	**11**	**43**
CORNING	11,061	167	2	6	......	......	2	2	1	2	11
HORNELLSVILLE	11,918	191	1	7	......	......	......	3	11	7	11
Addison	2,637	23	......	......	......	......	......	......	......	......	......
Avoca	2,125	14	......	......	......	......	......	......	......	......	......
Bath	3,443	66	......	......	......	......	......	......	......	......	3
Bath	4,494	44	......	......	......	......	......	......	......	......	8
Bradford	771	16	......	......	......	......	......	......	......	......	......
Cameron	1,353	9	......	......	......	......	......	......	......	......	......
Campbell	1,467	24	......	......	......	......	......	......	......	......	......
Canisteo	3,432	42	......	......	......	......	......	......	......	1	4
Caton	1,345	7	......	......	......	......	......	......	......	......	......
Cohocton	3,197	34	......	......	......	......	......	......	......	......	1
Corning	1,937	38	......	......	......	......	......	......	......	......	1

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Steuben county—(*continued*)											
Dansville	1,417	20	......	......	......	......	......	......	1	......	1
Erwin	1,851	25	......	......	......	......	......	1	1	......	......
Fremont	1,033	11	......	......	......	......	......	......	......	......	......
Greenwood	1,129	18	......	......	......	......	......	......	1	......	......
Hartsville	787	9	......	......	......	......	......	......	......	......	......
Hornby	959	8	......	1	......	......	......	......	......	1	......
Hornellsville	1,833	27	......	......	......	......	......	......	......	......	1
Howard	1,704	17	1	......	......	......	......	......	......	......	......
Jasper	1,430	13	......	......	......	......	......	......	......	......	1
Lindley	1,306	18	......	......	......	......	1	......	......	......	......
Prattsburg	2,197	21	......	1	......	......	......	......	......	......	1
Pultney	1,590	14	......	......	......	......	......	......	......	......	1
Rathbone	1,059	13	......	......	......	......	......	......	......	......	......
Thurston	1,017	9	......	......	......	......	......	......	......	......	......
Troupsburg	2,015	26	1	......	......	......	......	1	......	......	......
Tuscarora	1,301	7	......	......	......	......	......	......	......	......	1
Urbana	2,692	35	......	......	......	......	......	......	......	......	1
Wayland	2,984	29	......	......	......	1	......	......	......	......	2
Wayne	838	5	......	......	......	......	......	......	......	......	......
West Union	1,025	8	......	......	......	......	......	......	......	......	......
Wheeler	1,188	7	......	......	......	......	......	......	......	......	......
Woodhull	1,787	15	......	1	......	......	......	......	......	......	......
Suffolk county	77,582	1,094	2	7	......	4	1	22	9	18	85
Babylon	7,112	171	......	......	......	2	......	......	......	......	16
Brookhaven	14,592	220	......	8	......	......	......	1	8	4	19

East Hampton	2,724	28	.....	.....	.....	.....	.....	.....	.....	.....	2
Huntington	9,483	169	.....	2	.....	.....	.....	2	3	7	15
Islip	12,545	142	1	.....	.....	1	.....	1	1	1	6
Riverhead	4,503	65	.....	.....	.....	.....	1	.....	.....	.....	4
Shelter Island	1,066	15	.....	.....	.....	1	.....	2	.....	.....	.....
Smithtown	5,863	28	.....	1	.....	.....	.....	.....	1	.....	2
Southampton	9,424	119	1	.....	.....	.....	.....	6	.....	.....	7
Sag Harbor	1,969	57	.....	.....	.....	.....	.....	5	.....	1	9
Southold	8,301	80	.....	1	.....	.....	.....	5	1	5	5
Sullivan county	**32,306**	**509**	.....	**3**	**1**	.....	**1**	**1**	**5**	**5**	**88**
Bethel	2,248	27	.....	.....	.....	.....	.....	.....	.....	.....	1
Callicoon	2,054	36	.....	.....	.....	.....	.....	.....	.....	.....	2
Cochecton	1,117	19	.....	.....	.....	.....	.....	.....	.....	.....	1
Delaware	1,541	18	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fallsburg	2,974	34	.....	.....	1	.....	.....	.....	.....	2	1
Forestburg	625	5	.....	.....	.....	.....	.....	1	.....	.....	.....
Fremont	2,184	21	.....	.....	.....	.....	.....	.....	.....	.....	2
Highland	964	19	.....	.....	.....	.....	.....	.....	.....	.....	4
Liberty	4,568	132	.....	1	.....	.....	.....	.....	1	2	64
Lumberland	809	9	.....	.....	.....	.....	.....	.....	.....	.....	1
Mamakating	3,128	53	.....	1	.....	.....	.....	.....	1	.....	1
Neversink	2,039	14	.....	.....	.....	.....	.....	.....	.....	1	3
Rockland	3,426	40	.....	.....	.....	.....	1	.....	2	.....	.....
Thompson	3,739	72	.....	1	.....	.....	.....	.....	1	.....	8
Tusten	890	10	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tioga county	**27,951**	**435**	.....	**4**	**1**	**3**	.....	**5**	**5**	**10**	**18**
Waverly	4,465	81	.....	2	.....	2	.....	.....	1	4	7
Barton	1,916	21	.....	.....	.....	.....	.....	.....	1	1	.....
Berkshire	1,011	12	.....	.....	.....	.....	.....	.....	.....	.....	.....
Candor	3,330	48	.....	.....	1	.....	.....	3	1	.....	.....
Newark Valley	2,164	30	.....	1	.....	.....	.....	.....	.....	.....	1
Nichols	1,564	28	.....	.....	.....	.....	.....	.....	.....	.....	1
Owego	3,339	58	.....	.....	.....	.....	.....	.....	.....	1	1
Owego	5,039	80	.....	.....	.....	.....	.....	2	1	3	5

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Tioga county—(*continued*)											
Richford	1,142	20	......	......	......	......	......	......	......	......	......
Spencer	1,868	27	......	......	......	......	......	......	......	1	2
Tioga	2,113	30	......	1	......	1	......	......	1	......	1
Tompkins county	**33,830**	**579**	......	**52**	......	**2**	......	**4**	**1**	**9**	**27**
ITHACA	13,136	269	......	50	......	2	......	1	1	9	18
Caroline	1,938	33	......	......	......	......	......	......	......	......	......
Danby	1,449	18	......	......	......	......	......	......	......	......	......
Dryden	3,785	60	......	1	......	......	......	2	......	......	1
Enfield	1,214	13	......	1	......	......	......	......	......	......	......
Groton	3,564	52	......	......	......	......	......	......	......	......	3
Ithaca	1,516	24	......	......	......	......	......	......	......	......	1
Lansing	2,550	26	......	......	......	......	......	......	......	......	1
Newfield	1,902	26	......	......	......	......	......	......	......	......	......
Ulysses	2,776	58	......	......	......	......	......	1	......	......	3
Ulster county	**88,422**	**1,289**	**2**	**11**	**6**	**26**	**1**	**11**	**15**	**38**	**112**
KINGSTON	24,535	426	......	5	4	18	......	4	5	18	43
Denning	783	3	......	1	......	......	......	......	......	......	......
Esopus	4,907	76	......	1	......	3	......	2	2	2	6
Gardiner	1,509	19	......	......	......	......	......	......	1	......	......
Hardenburg	722	10	......	......	......	......	......	......	......	......	......
Hurley	1,903	41	......	1	......	......	......	......	1	......	8
Kingston	524	7	......	......	......	......	......	......	2	1	......
Lloyd	2,608	45	......	......	......	......	......	1	......	......	2

Marbletown	3,511	39	1	......	......	......	......	......	......	1	4
Marlborough	3,978	50	......	......	......	......	......	......	......	1	3
New Paltz	2,264	46	......	......	......	......	......	......	......	1	3
Olive	2,465	39	......	......	......	......	......	......	......	1	4
Plattekill	1,866	20	......	......	......	......	......	......	1	......	3
Rochester	2,874	30	1	......	......	......	......	......	......	4	1
Rosendale	6,278	58	......	......	2	1	......	1	......	2	3
Saugerties	6,057	103	......	......	......	......	......	3	......	2	9
Saugerties	3,697	55	......	......	......	......	......	......	1	2	6
Shandaken	3,053	48	......	1	......	1	......	......	......	......	3
Shawangunk	2,406	27	......	......	......	......	......	......	......	......	......
Ulster	3,582	41	......	......	......	2	1	......	1	1	4
Wawarsing	4,346	43	......	1	......	......	......	......	......	......	4
Ellenville	2,879	33	......	......	......	1	......	......	......	2	2
Woodstock	1,675	30	......	1	......	......	......	......	1	......	4
Warren county	29,943	452	3	8	1	1	......	......	1	15	37
Bolton	1,363	15	......	......	......	......	......	......	......	......	2
Caldwell	1,465	21	......	2	......	......	......	......	......	......	1
Chester	2,052	30	......	......	......	......	......	......	......	1	5
Hague	1,042	12	......	......	......	......	......	......	......	......	1
Horicon	1,136	13	......	......	......	......	......	......	......	1	......
Johnsburg	2,374	42	......	......	......	......	......	......	......	2	6
Luzerne	1,341	25	......	1	......	......	......	......	......	......	1
Queensbury	2,377	52	......	1	......	......	......	......	......	......	3
Glens Falls	12,613	175	2	4	1	......	......	......	......	......	......
Stony Creek	1,019	8	......	......	......	......	......	......	1	11	13
Thurman	809	13	......	......	......	......	......	......	......	......	2
Warrensburg	2,352	46	1	......	......	1	......	......	......	......	3
Washington county	45,624	666	1	7	......	1	......	1	1	15	31
Argyle	1,995	36	......	1	......	......	......	......	......	......	......
Cambridge	1,878	37	......	......	......	......	......	......	......	......	1
Dresden	545	3	......	......	......	......	......	......	......	......	......
Easton	2,247	26	......	......	......	......	......	......	......	......	1
Fort Ann	2,263	27	......	......	......	......	......	......	......	......	2
Fort Edward	5,216	74	......	......	......	......	......	1	......	4	......

Record of each reporting local board of health, etc.—(Continued)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Washington county—(*continued*)											
Sandy Hill	4,473	58	......	2	......	......	......	......	......	3	5
Granville	5,217	95	......	......	......	......	......	......	1	4	5
Greenwich	4,172	70	......	2	......	1	......	......	......	......	6
Hampton	689	10	1	......	......	......	......	......	......	......	1
Hartford	1,290	27	......	......	......	......	......	......	......	1	......
Hebron	1,679	20	......	......	......	......	......	......	......	......	1
Jackson	1,059	10	......	......	......	......	......	......	......	1	......
Kingsbury	1,627	23	......	1	......	......	......	......	......	......	1
Putnam	505	7	......	......	......	......	......	......	......	......	1
Salem	2,978	43	......	......	......	......	......	......	......	......	2
White Creek	2,496	27	......	......	......	......	......	......	......	......	1
Whitehall	919	19	......	......	......	......	......	......	......	1	......
Whitehall	4,377	54	......	1	......	......	......	......	......	1	4
Wayne county	**48,660**	**729**	......	**3**	......	**5**	**6**	**1**	**3**	**10**	**46**
Newark	4,578	83	......	......	......	1	......	......	......	4	8
Arcadia	2,468	31	......	......	......	......	......	......	1	......	1
Butler	1,786	19	......	......	......	......	......	......	......	......	......
Galen	2,099	14	......	......	......	......	1	......	......	......	1
Clyde	2,507	48	......	1	......	2	......	......	......	2	5
Huron	1,667	18	......	......	......	......	......	......	......	......	......
Lyons	5,824	82	......	......	......	......	......	......	......	1	4
Macedon	2,488	49	......	......	......	......	......	......	......	......	4
Marion	2,015	28	......	1	......	1	2	......	......	1	3

Ontario	2,550	27									
Palmyra	3,758	62				1	2	1		1	5
Rose	2,055	37									
Savannah	1,733	25									2
Sodus	5,118	91							1		5
Walworth	2,137	28					1				3
Williamson	2,670	41		1					1	1	3
Wolcott	3,207	48									2
Westchester county	**183,375**	**2,895**	**14**	**29**	**5**	**10**	**11**	**12**	**41**	**166**	**296**
YONKERS	47,931	842	7	8	2	4		1	21	81	118
MOUNT VERNON	20,346	282	1	2	1			2	1	17	24
Bedford	3,497	93		1						1	19
Cortlandt	8,345	113							2	1	11
Peekskill	10,358	184	1	4	1		4		2	13	16
East Chester	3,040	22								1	
Greenburg	14,894	187		2		2	2	3	3	14	14
Harrison	2,048	25									
Lewisboro	1,311	19									1
Mamaroneck	3,849	77		1		1			1		5
Mount Pleasant	8,698	206	1						1	1	17
New Castle	2,401	35									3
NEW ROCHELLE	14,720	208	2	4	1	1	3	1	4	7	19
North Castle	1,471	17						1			1
North Salem	1,133	15									1
Ossining	2,956	24									2
Ossining	7,939	142		2				1		3	15
Pelham	1,571	14								1	
Poundridge	823	10									
Port Chester	7,440	147		5			1	1	4	16	13
Rye	5,421	41				1		1	2	1	
Scarsdale	885	8									
Somers	1,338	14									3
White Plains	640	5									
White Plains	7,899	133	2			1	1	1		9	10
Yorktown	2,421	32									3

Record of each reporting local board of health, etc.—(Concluded)

NAME OF PLACE	Population	All deaths	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases	Scarlet fever	Measles	Whooping cough	Diphtheria	Diarrhea	Consumption
Wyoming county	30,413	409	......	5	......	......	......	......	1	1	15
Arcade	1,877	22	......	1	......	......	......	......	......	......	......
Attica	2,677	31	......	......	......	......	......	......	......	......	......
Bennington	1,904	21	......	......	......	......	......	......	......	......	1
Castile	2,539	41	......	1	......	......	......	......	......	......	4
Covington	930	10	......	......	......	......	......	......	1	......	1
Eagle	1,114	19	......	......	......	......	......	......	......	......	......
Gainesville	2,325	39	......	......	......	......	......	......	......	......	5
Genesee Falls	658	10	......	1	......	......	......	......	......	......	......
Java	1,770	22	......	......	......	......	......	......	......	......	......
Middlebury	1,406	12	......	......	......	......	......	......	......	......	......
Orangeville	1,005	26	......	......	......	......	......	......	......	......	1
Perry	3,862	51	......	1	......	......	......	......	......	......	1
Pike	1,277	20	......	1	......	......	......	......	......	......	......
Sheldon	1,801	15	......	......	......	......	......	......	......	......	......
Warsaw	4,341	52	......	......	......	......	......	......	......	1	2
Wethersfield	927	18	......	......	......	......	......	......	......	......	......
Yates county	20,318	317	......	4	......	......	1	......	2	4	......
Barrington	1,249	14	......	......	......	......	......	......	......	......	......
Benton	1,970	28	......	1	......	......	......	......	......	......	......
Dundee	1,291	......	......	......	......	......	......	......	......	......	......
Italy	1,094	11	......	......	......	......	......	......	1	......	10
Jerusalem	2,775	48	......	......	......	......	......	......	......	1	2
Middlesex	1,282	30	......	......	......	......	......	......	1	......	3

Milo	1,877	29					1				2
Penn Yan	4,650	73		3						1	9
Potter	1,520	29									1
Starkey	1,545	38								1	2
Torrey	1,065	17								1	
State prisons		7									
State Hospital for Insane		760		3						2	104
Other public institutions		160								1	13

[395 deaths in public institutions have been credited elsewhere, to the localities in which they are situated.]

MONTHLY BULLETIN OF THE NEW YORK STATE

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
MARITIME DISTRICT										
Totals....................	4,052,875	6,475	19.0	1,797	27.8	729	95	21	46	4
CITY OF NEW YORK										
Totals....................	3,732,903	6,059	19.0	1,704	28.0	645	96	19	40	4
BOROUGH OF MANHATTAN..	1,917,676	3,422	21.0	1,034	30.2	294	110	14	21	....
BOROUGH OF THE BRONX..	268,341	402	17.8	101	25.0	43	130	....	4	1
BOROUGH OF BROOKLYN...	1,291,597	1,934	17.6	488	25.2	266	85	5	12	3
BOROUGH OF QUEENS.......	182,681	219	13.2	60	27.3	34	95	....	1	....
BOROUGH OF RICHMOND...	72,608	82	13.3	21	25.0	8	100	....	2	....
Oyster Bay..................	16,334	3	......	0	......	1	......	....	....	....
Hempstead	27,066	18	......	5	27.7	5	......	....	....	....
North Hempstead..........	12,048	15	......	4	26.6	2	......	....	....	....
Southold	8,301	2	......	1	......	1	......	....	....	....
Sag Harbor	3,500	4	......	1	25.0	0	250	....	....	....
Huntington	9,483	17	......	3	17.7	2	......	....	....	....
Brookhaven	14,592	17	......	3	17.7	7	......	....	....	....
YONKERS	50,000	85	20.0	33	38.8	15	127	2	2	....
Greenburg....................	15,564	18	......	3	16.6	5	166	....	....	....
MOUNT VERNON..............	20,346	25	14.5	8	32.0	4	40	....	....	....
Port Chester...............	7,440	13	......	1	7.5	2	75	....	1	....
Ossining....................	7,939	11	......	1	9.0	3	90	....	1	....
NEW ROCHELLE	14,720	19	......	3	15.6	1	105	....	....	....
Peekskill...................	10,358	20	......	7	35.0	3	100	....	2	....
White Plains................	7,900	11	......	2	18.2	3	......	....	....	....
Rest of District.............	94,382	138	17.5	18	13.0	30	60	....	....	....
HUDSON VALLEY DIST.										
Totals....................	696,000	1,005	17.4	186	18.5	240	68	2	21	2
ALBANY	100,000	153	18.0	25	16.4	28	45	....	1	....
COHOES	24,000	44	21.5	14	31.5	5	225	....	6	....
TROY..........................	75.057	123	19.3	27	22.0	9	32	....	3	....
WATERVLIET.................	14,321	20	......	2	10.0	5	150	....	2	....
Green Island................	4,770	6	......	1	16.7	2	......	....	....	....
Hoosick Falls...............	5,671	5	......	3	60.0	0	......	....	....	....
RENSSELAER.................	7,466	22	......	8	36.4	3	182	1	....	....
Coxsackie	4,102	4	......	0	......	7	333	....	1	....
Catskill.	5,486	11	......	2	18.2	6	90	....	....	....
HUDSON.......................	9,528	15	......	5	33.3	3	133	....	....	....
KINGSTON....................	24,535	42	19.7	9	22.0	11	100	....	2	1
Ellenville	3,000	1	......	0	......	0	......	....	....	....
Marbletown	3,511	4	......	1	25.0	2	......	....	....	....
Rosendale....................	6,278	3	......	1	33.3	1	......	....	....	....
Esopus	4,907	4	......	1	25.0	0	250	....	....	....
Saugerties...................	3,700	4	......	2	50.0	0	250	....	....	....
POUGHKEEPSIE..............	24,029	52	25.0	13	25.0	15	40	....	1	....
Fishkill.......................	13,016	21	......	6	28.5	4	50	....	....	....
Wappinger Falls...........	3,504	9	......	1	11.1	1	111	....	....	1
NEWBURGH	25,000	44	20.7	6	11.0	10	20	....	....	....
Port Jervis...................	9,885	16	......	2	12.5	4	......	....	....	....
MIDDLETOWN................	14,522	18	......	1	5.5	6	111	1	....	....
Warwick.......................	6,408	10	......	2	20.0	1	......	....	....	....
Goshen	4,564	8	......	1	12.5	4	......	....	....	....
Montgomery	5,939	11	......	0	......	6	90	....	....	....
Haverstraw..................	9,874	10	......	2	20.0	1	......	....	....	....
Nyack	4,275	3	......	2	66.6	0	......	....	....	....
Ramapo.......................	7,502	12	......	3	25.0	1	166	....	....	....
Rest of District	271,800	330	14.5	46	14.0	110	60	....	5	....

DEPARTMENT OF HEALTH—VOLUME XIX

districts, cities, villages and towns during January, 1903

villages in *italics* and towns in Roman type]

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
2	65	34	20	43	219	157	1,296	816	61	227	644	611	513	260	357	113	966
2	65	33	19	37	213	149	1,246	761	57	209	606	560	456	237	337	88	921
....	32	22	11	21	111	103	732	381	26	117	332	297	237	152	215	33	565
2	14	6	2	3	17	4	50	121	4	5	30	35	36	13	15	5	35
....	16	5	2	12	74	35	390	230	24	73	213	201	156	61	87	43	292
....	2	....	3	1	8	6	59	20	3	5	24	17	22	5	16	7	20
....	1	....	1	....	3	1	15	9	....	9	7	10	5	6	4	....	9
....	....	....	....	....	....	......	......	2	....	......	1	......	......	....	......	....	......
....	....	....	....	....	....	......	3	1	....	2	2	2	2	2	......	1	3
....	....	....	....	....	....	......	4	2	....	......	1	......	3	2	......	1	2
....	....	....	....	....	....	......	1	......	....	......	....	......	1	....	......	....	......
....	....	....	....	....	....	......	......	2	....	......	....	......	......	1	......	....	......
....	....	....	....	1	....	......	4	2	....	1	2	......	......	2	1	2	3
....	....	....	....	....	....	......	1	3	....	......	2	3	2	....	1	3	2
....	....	....	1	....	1	5	18	11	2	3	8	9	16	4	2	....	6
....	....	1	....	2	....	......	4	1	....	......	2	2	2	1	......	1	2
....	....	....	....	1	....	......	4	1	....	3	2	4	2	....	4	2	2
....	....	....	....	....	....	......	......	1	....	4	....	2	1	1	2	1	......
....	....	....	....	....	....	......	2	......	....	......	1	3	3	....	......	1	......
....	....	....	....	1	1	......	2	3	1	1	1	4	2	1	......	....	2
....	....	....	....	....	....	......	4	2	....	1	3	1	2	....	1	....	4
....	....	....	....	....	....	......	2	......	....	......	1	2	2	....	1	1	2
....	....	....	....	1	4	3	6	24	1	3	12	19	19	9	8	12	17
....	8	....	....	13	11	11	182	114	4	59	84	129	135	40	39	53	98
....	2	....	....	4	....	......	23	33	1	8	12	25	17	8	2	5	12
....	....	....	....	2	....	2	5	5	....	4	3	......	9	....	......	4	4
....	....	....	....	....	1	......	24	23	....	5	12	11	11	4	5	3	21
....	....	....	....	1	....	......	4	1	....	2	2	4	3	....	......	1	......
....	....	....	....	....	....	......	2	......	....	......	2	......	2	....	......	....	......
....	....	....	....	....	....	......	2	......	....	......	....	......	......	....	1	....	2
....	....	....	....	3	....	......	4	4	....	3	....	......	4	....	1	....	2
....	....	....	....	....	....	......	......	1	....	1	....	......	1	....	......	....	......
....	....	....	....	....	....	1	3	......	....	2	1	......	3	....	......	....	1
....	....	....	....	....	1	1	2	1	....	2	....	1	2	1	......	1	3
....	....	....	....	....	1	......	7	2	....	3	2	10	4	1	......	3	6
....	....	....	....	....	....	......	......	1	....	......	....	......	......	....	......	....	......
....	....	....	....	....	....	......	......	......	....	......	1	1	2	....	......	....	......
....	....	....	....	....	....	......	2	......	....	......	....	......	......	....	......	....	1
....	1	....	....	....	....	......	1	......	....	......	....	......	......	....	1	....	1
....	....	....	....	....	1	......	......	......	....	1	1	......	1	....	......	....	......
....	....	....	....	....	1	......	9	3	1	3	5	5	6	3	4	6	5
....	....	....	....	....	....	1	4	4	....	1	....	1	4	1	1	1	3
....	....	....	....	....	....	......	1	2	....	......	2	1	1	1	......	....	......
....	1	....	....	....	....	......	6	4	....	3	9	9	6	2	......	3	1
....	....	....	....	....	....	......	4	1	....	2	3	1	1	....	......	1	3
....	....	....	....	....	1	......	3	1	....	1	1	1	1	....	6	2	......
....	....	....	....	....	....	......	3	......	....	1	....	1	......	2	......	1	2
....	....	....	....	....	....	......	1	......	....	......	1	......	1	1	1	2	1
....	....	....	....	....	1	......	2	......	....	1	....	1	5	....	......	1	......
....	....	....	....	....	....	......	2	3	....	1	2	......	1	....	......	1	......
....	....	....	....	....	....	......	1	......	....	......	....	......	1	....	......	....	1
....	....	....	....	....	1	1	1	2	....	......	2	1	1	....	......	1	2
....	4	....	....	3	3	5	66	23	2	15	23	56	48	16	17	17	27

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
ADIRONDACK AND NORTHERN DISTRICT										
Totals	394,772	505	15.0	94	17.5	106	54	5	11	....
WATERTOWN	21,700	24	14.0	10	42.5	3	85	1	....	....
Ellisburgh	3,858	5	......	0	......	3	......	....	....	....
Cape Vincent	2,682	5	......	1	20.0	3	......	....	....	....
Clayton	4,313	9	......	2	22.2	4	......	....	....	....
OGDENSBURGH	12,633	24	22.0	5	20.8	9	166	....	2	....
Gouverneur	6,000	2	......	1	50.0	1	......	....	....	....
Potsdam	3,843	1	......	0	......	0	......	....	....	....
Canton	6,387	11	......	0	...	3	......	....	1	....
Malone	5,925	7	......	4	57.0	0	......	....	....	....
Plattsburgh	8,434	12	......	6	50.0	1	85	....	....	....
Glens Falls	12,613	11	......	3	27.3	3	......	....	....	....
Whitehall	4,377	14	......	1	7.7	5	......	....	....	....
Fort Edward	5,216	7	......	3	42.5	0	......	....	....	....
Sandy Hill	4,473	5	......	2	40.0	2	200	....	....	....
Granville	5,217	16	......	2	12.5	5	......	....	....	....
Greenwich	4,172	4	......	0	......	1	......	....	....	....
Lowville	3,746	9	......	2	......	5	......	....	....	....
Rest of District	279,000	339	14.5	52	53.2	118	60	4	8	....
MOHAWK VALLEY DIST.										
Totals	430,000	562	16.0	108	19.2	153	84	4	8	....
SCHENECTADY	47,625	56	14.0	17	30.0	17	142	....	1	....
Cobleskill	3,973	5	......	2	40.0	2	......	....	....	....
AMSTERDAM	20,929	23	13.0	9	38.0	3	300	....	....	....
Fort Plain	2,444	6	......	0	......	1	......	....	....	....
JOHNSTOWN	10,130	17	20.0	3	17.6	2	176	....	2	....
GLOVERSVILLE	18,349	26	16.5	7	27.0	1	35	....	....	....
LITTLE FALLS	10,381	6	......	1	16.6	0	166	....	....	....
Herkimer	5,555	6	......	0	......	1	......	....	....	....
Ilion	5,138	3	......	2	66.6	1	......	....	....	....
UTICA	56,383	90	18.7	17	18.8	10	75	2	....	....
Whitestown	6,235	7	......	2	28.5	1	......	....	....	....
ROME	15,343	20	15.5	4	20.0	2	......	....	....	....
Boonville	3,332	3	......	0	......	1	333	....	....	....
Camden	3,745	4	......	0	......	2	......	....	....	....
Waterford	6,157	11	......	1	9.0	3	90	....	....	....
Mechanicville	4,695	3	......	1	......	0	333	1	....	....
Ballston Spa	3,923	4	......	1	25.0	1	250	....	....	....
Saratoga Springs	12,409	23	20.0	5	21.8	4	85	....	....	....
Rest of District	182,250	249	15.5	36	14.5	100	60	1	5	....
SOUTHERN TIER DISTRICT										
Totals	429,530	520	14.5	78	15.0	178	75	1	15	....
BINGHAMTON	39.647	59	17.5	7	14.0	21	100	....	3	....
Owego	5,039	9	......	0	......	2	111	....	....	....
Candor	3,330	4	......	0	......	4	......	....	....	....
Waverly	4,465	10	......	2	20.0	3	100	....	....	....
ELMIRA	35,672	41	13.5	9	22.5	15	75	....	1	....
Horseheads	4,944	4	......	0	......	1	......	....	....	....
HORNELLSVILLE	12,000	12	......	2	16.6	3	......	....	....	....
Bath	5,000	8	......	1	12.5	3	......	....	....	....
CORNING	11,061	8	......	2	25.0	2	250	....	2	....
Wellsville	5,000	6	......	3	50.0	0	......	....	....	....
OLEAN	9,462	9	......	3	33.3	1	......	....	....	....
Salamanca	4,251	3	......	1	33.3	1	......	....	....	....
DUNKIRK	11,616	29	......	8	27.5	2	200	....	1	....

FOR JANUARY—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	1	2	....	1	8	5	71	48	1	40	86	66	75	17	27	50	51
....	....	....	....	....	1	......	1	8	....	8	2	2	8	....	1	2	5
....	....	....	....	....	....	......	......	......	....	1	1	1	2	....	......	....	......
....	....	....	....	....	....	......	1	1	....	......	....	1	2	....	......	....	......
....	....	....	....	....	....	......	1	2	....	1	....	1	......	1	......	2	1
....	1	....	....	....	....	1	6	4	....	......	1	8	2	2	......	2	......
....	....	....	....	....	....	......	......	......	....	......	....	......	1	....	......	....	1
....	....	....	....	....	....	......	......	......	....	......	....	......	......	1	......	....	......
....	....	....	....	....	....	......	8	1	....	......	1	4	......	....	......	1	......
....	....	....	....	....	....	......	1	......	....	1	....	......	1	....	......	....	4
....	....	1	....	....	....	......	1	......	....	1	1	2	2	....	1	1	2
....	....	....	....	....	....	......	1	8	....	......	....	1	2	....	1	1	2
....	....	....	....	....	....	......	2	2	....	8	2	1	2	1	......	....	1
....	....	....	....	....	....	......	2	......	....	1	....	1	2	....	......	1	......
....	....	....	....	....	....	1	1	......	....	1	1	......	......	....	......	1	......
....	....	....	....	....	....	......	8	......	....	2	3	......	2	1	1	8	1
....	....	....	....	....	....	......	......	......	....	1	....	......	8	....	......	....	......
....	....	....	....	....	....	......	1	......	....	2	2	......	......	....	1	1	5
....	....	1	....	1	2	8	47	27	1	23	22	49	51	11	22	85	82
....	7	1	2	4	12	9	74	49	1	40	40	65	87	24	24	41	70
....	....	1	1	....	3	2	6	3	....	1	7	8	9	2	5	4	8
....	....	....	....	....	....	......	......	1	....	......	....	......	2	....	1	....	1
....	6	....	....	....	....	1	3	......	....	4	1	1	2	....	8	....	2
....	....	....	....	....	....	......	......	......	....	......	....	2	2	1	......	1	......
....	....	....	....	....	....	1	......	1	....	1	1	1	3	1	1	1	4
....	....	....	....	....	1	......	4	2	....	2	8	1	7	....	......	....	6
....	....	....	....	....	1	......	1	1	....	......	1	2	......	....	......	....	......
....	....	....	....	....	....	......	......	1	....	......	....	2	2	1	......	....	......
....	....	....	....	....	....	......	......	......	....	1	....	......	......	....	......	1	1
....	....	....	....	....	8	2	18	10	....	6	7	8	11	5	4	1	18
....	....	....	....	....	....	......	1	......	....	1	....	1	1	....	......	....	3
....	....	....	....	....	....	......	2	4	....	......	....	1	8	1	......	2	7
....	....	....	....	....	1	......	1	1	....	......	....	......	......	....	......	....	......
....	....	....	....	....	....	......	1	......	....	......	....	1	1	....	......	1	......
....	....	....	....	1	....	......	3	1	....	......	2	2	1	1	......	....	......
....	....	....	....	....	....	......	......	......	....	1	....	1	......	....	......	....	......
....	....	....	....	....	1	......	......	1	....	......	....	1	1	....	......	....	......
....	....	....	....	2	....	......	8	4	....	8	1	2	2	....	1	4	1
....	1	....	1	1	2	8	81	19	1	20	17	86	40	12	9	26	24
....	8	....	....	2	14	8	66	28	5	42	86	84	53	23	25	61	59
....	....	....	....	....	8	......	6	8	2	2	8	5	5	....	1	9	7
....	....	....	....	....	....	1	1	......	....	......	2	8	......	1	1	....	......
....	....	....	....	....	....	......	2	......	....	......	....	......	1	1	......	....	......
....	....	....	....	....	1	......	2	......	....	......	....	1	2	....	1	2	1
....	....	....	....	1	1	1	8	......	....	5	6	5	5	2	8	2	6
....	....	....	....	....	....	......	......	......	....	2	....	......	......	....	1	....	1
....	....	....	....	....	....	......	1	......	....	1	1	......	5	1	1	....	2
....	....	....	....	....	....	......	......	......	....	1	....	......	2	....	2	2	1
....	....	....	....	....	....	......	2	......	....	2	....	......	......	....	......	1	1
....	....	....	....	....	....	......	2	......	....	......	....	8	......	....	......	....	1
....	....	....	....	....	....	......	1	......	....	1	....	......	1	1	......	1	4
....	....	....	....	....	....	......	2	......	....	......	....	......	1	....	......	....	......
....	1	....	....	....	8	1	6	1	1	8	1	4	......	....	2	1	4

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
SOUTHERN TIER DISTRICT—(*Continued*)										
JAMESTOWN	22,892	22	12.0	3	13.6	9	90	....	....	....
Westfield	2,430	4	......	1	25.0	2	......	....	....	....
Fredonia	4,125	6	......	0	......	2	......	....	....	....
Rest of District	248,600	286	14.0	31	11.0	109	55	1	8	....
EAST CENTRAL DISTRICT Totals	408,000	541	16.0	71	13.5	189	57	....	7	....
SYRACUSE	108,374	115	13.0	23	20.0	20	136	....	1	....
Baldwinsville	3,000	8	......	0	......	6	......	....	....	....
De Witt	5,435	13	......	3	23.0	4	75	....	1	....
Cortland	9,014	9	......	0	......	2	......	....	....	....
Homer	2,381	5	......	1	20.0	3	......	....	....	....
ONEIDA	7,942	13	......	1	7.5	6	......	....	....	....
Hamilton	3,744	4	......	0	......	0	250	....	....	....
Cazenovia	3,830	1	......	0	......	1	......	....	....	....
Canastota	3,300	5	......	0	......	1	......	....	....	....
Norwich	5,766	13	......	2	15.6	3	......	....	....	....
Oneonta	7,147	9	......	3	33.3	1	......	....	....	....
Worcester	2,409	7	......	0	......	4	......	....	....	....
Cooperstown	2,368	6	......	0	......	3	166	....	1	....
Walton	4,869	6	......	3	50.0	2	......	....	....	....
Delhi	3,243	5	......	1	20.0	2	......	....	....	....
Liberty	4,568	12	......	3	25.0	2	......	....	....	....
Rest of District	225,540	310	16.5	31	10.0	129	30	....	4	....
WEST CENTRAL DISTRICT Totals	320,600	431	15.5	53	12.5	74	40	2	6	1
AUBURN	35,000	45	15.1	7	15.5	6	25	....	....	....
ITHACA	13,136	22	20.0	3	13.6	7	45	....	1	....
Hector	4,137	6	......	1	16.6	5	......	....	....	....
Waterloo	4,256	3	......	0	......	0	......	....	....	....
Seneca Falls	6,519	9	......	1	11.1	5	111	....	....	....
GENEVA	10,433	21	20.0	4	19.0	3	95	1	1	....
Canandaigua	6,151	8	......	1	12.5	3	125	....	....	....
Manchester	4,733	4	......	1	25.0	1	......	....	....	....
Phelps	4,788	4	......	0	......	2	......	....	....	....
Penn Yan	4,650	9	......	1	12.5	3	125	....	1	....
Batavia	9,180	10	......	1	10.0	0	......	....	....	....
Dansville	3,633	7	.....	0	......	2	......	....	....	....
Le Roy	3,144	5	......	2	40.0	0	......	....	....	....
Warsaw	4,341	7	......	1	14.2	4	......	....	....	....
Rest of District	206,500	271	15.5	30	11.5	136	35	1	3	1
LAKE ONTARIO AND WESTERN DISTRICT Totals	893,819	1,107	14.5	249	22.5	243	110	4	38	1
BUFFALO	370,000	441	13.5	127	29.0	51	107	2	16	....
TONAWANDA	7,421	12	......	5	41.6	2	85	....	1	....
Amherst	4,223	7	......	1	14.2	2	142	....	....	....
NORTH TONAWANDA	9,069	10	......	3	30.0	2	100	....	1	....
LOCKPORT	16,581	24	......	3	12.5	6	85	....	....	....
NIAGARA FALLS	19,457	35	21.5	16	45.5	1	230	....	3	....
Medina	4,716	4	......	1	25.0	2	......	....	....	....
Albion	4,477	7	......	1	14.2	3	......	....	....	....
Brockport	3,400	3	......	0	......	0	......	....	....	....
ROCHESTER	162,608	223	16.0	37	16.6	48	115	....	2	....
Palmyra	3,758	4	......	0	......	0	......	....	....	....

FOR JANUARY—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	2	......	......	1	....	8	....	6	......	8	8	4	......
....	....	....	....	....	....	......	......	......	....	......	....	1	1	....	......	1	1
....	....	....	....	....	....	......	......	1	....	......	....	......	1	1	......	1	2
....	2	....	....	1	4	......	88	17	2	22	18	56	29	18	10	87	28
....	2	2	1	8	7	7	65	41	4	35	40	88	82	28	81	56	47
....	2	1	....	2	5	4	16	10	1	5	6	18	12	10	5	9	18
....	....	....	....	....	....	......	......	......	....	1	....	2	2	1	......	1	1
....	....	....	....	....	....	......	2	......	....	......	1	8	......	1	1	2	2
....	....	....	....	....	....	......	2	......	....	......	2	1	8	1	......	....	......
....	....	....	....	....	....	......	2	......	....	......	1	......	......	1	......	....	1
....	....	....	....	....	....	......	......	......	....	1	1	2	2	....	1	8	8
....	....	....	....	....	....	1	......	1	....	......	1	1	......	....	......	....	......
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	1	......
....	....	....	....	....	....	......	......	1	....	1	....	......	1	....	......	....	2
....	....	....	....	....	....	......	1	1	....	2	1	2	2	1	1	1	1
....	....	....	....	....	....	......	2	1	....	......	1	......	8	....	2	....	......
....	....	....	....	....	....	......	......	......	1	......	2	1	......	1	......	2	......
....	....	....	....	....	....	......	1	......	....	......	....	1	2	....	1	....	......
....	....	....	....	....	....	......	......	......	....	1	1	1	......	....	......	1	2
....	....	....	....	....	....	......	......	1	....	1	1	......	......	....	1	....	1
....	....	....	....	....	....	......	......	8	....	......	....	2	4	....	......	2	1
....	....	1	1	1	2	2	39	23	2	23	22	54	51	12	19	84	20
....	....	....	....	2	2	8	52	26	3	37	27	84	63	19	21	51	32
....	....	....	....	....	1	......	5	6	1	8	8	11	3	1	1	4	6
....	....	....	....	....	....	......	8	2	....	......	1	4	4	....	2	2	8
....	....	....	....	....	....	......	1	......	....	1	....	2	1	1	......	....	......
....	....	....	....	....	....	......	......	......	....	1	....	2	......	....	......	....	......
....	....	....	....	....	1	......	2	1	....	1	2	......	2	....	......	....	......
....	....	....	....	....	....	......	1	2	....	2	2	5	1	1	1	1	8
....	....	....	....	....	....	1	2	......	....	2	1	......	2	....	......	....	......
....	....	....	....	....	....	......	2	......	....	......	....	......	1	1	......	....	......
....	....	....	....	....	....	......	......	1	....	......	....	1	......	....	1	1	......
....	....	....	....	....	....	......	......	......	....	......	....	1	2	....	......	8	2
....	....	....	....	....	....	......	1	1	....	......	2	......	2	2	2	....	......
....	....	....	....	....	....	......	2	......	....	1	....	2	1	....	1	....	......
....	....	....	....	....	....	......	......	......	1	1	....	......	1	....	1	....	1
....	....	....	....	....	....	......	1	......	....	2	....	2	1	....	1	....	......
....	....	....	....	2	....	2	32	13	1	23	16	54	42	13	11	40	17
18	12	1	4	5	20	16	185	88	11	67	69	184	151	56	44	65	118
....	8	1	2	8	10	10	84	42	6	21	28	44	68	20	17	15	49
....	....	....	....	....	....	......	......	......	....	2	....	1	1	....	......	1	6
....	....	....	....	1	....	......	1	1	....	......	1	......	1	....	1	....	1
....	....	....	....	....	....	......	1	2	....	......	1	......	1	1	......	2	1
....	1	....	....	....	....	......	4	1	....	1	2	5	7	....	2	....	......
....	5	....	....	....	....	1	8	2	1	4	5	2	......	1	1	1	6
....	....	....	....	....	....	......	......	......	....	......	....	1	1	....	1	....	1
....	....	....	....	....	....	......	1	......	....	......	1	1	1	....	1	....	2
....	....	....	....	....	....	......	......	......	....	1	....	2	......	....	......	....	......
18	2	....	1	....	1	2	88	19	2	20	10	82	26	16	3	15	16
....	....	....	....	....	....	......	......	1	....	......	1	......	1	....	......	....	1

MONTHLY BULLETIN

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
LAKE ONTARIO AND WESTERN DIST.—(*Con.*)										
Newark	4,578	12	......	0	......	4	......	....	....	....
Lyons	5,824	9	......	4	44.4	0	......	....	....	....
Clyde	2,507	....	......	......	......	......	......	....	....	....
OSWEGO	22,200	24	14.0	6	25.0	4	210	....	2	...
FULTON	8,734	15	......	2	13.3	4	65	....	1	....
Richland	3,535	7	......	2	28.5	3	......	....	....	....
Rest of District	244,184	270	14.0	41	15.0	1,102	100	2	11	1
Totals for the state	7,910,600	11,146	17.0	2,625	23.5	2,080	85	39	152	8
Average for past five years	....	11,220	18.7	2,657	24.0	2,015	90	40	143	17

REMARKS—The weather of December was characterized by temperature considerably below the average of preceding years, few showing so low a mean for the month, the second week of the month being especially cold, but preceded and followed by unusually high temperature; by large snow-fall, continuing from the preceding month, and a precipitation above the average, the humidity of the atmosphere being high; by few clear days save in the maritime and eastern part of the State. The weather of January was generally near the normal.

BUBONIC PLAGUE—An inquiry in the form of resolutions was recently made in the Legislature of this State noting the fact of a conference of representatives of State Boards of Health, lately held in Washington, at which was revealed an alarming spread of bubonic plague on the Pacific coast and a lamentable lack of effort to stamp it out, so that action on the part of the Federal authorities and of other States would soon be imperative, and calling on the Commissioner of Health of this State to report his part in the conference and the measures proposed to protect the State; the Commissioner made the following report to the Speaker of the Assembly:

"In response to the resolution passed by the Assembly calling for information concerning the bubonic plague in San Francisco, and asking what steps, if any, the State Department of Health has taken to prevent its spread to this and other States, I beg leave to report as follows: The first cases of bubonic plague occurred in San Francisco (Chinatown) nearly three years ago and were promptly recognized by the health authorities of the city of San Francisco and the State of California, who immediately took measures to prevent its spread.

"The State authorities, thinking that the existence of plague in the city would be an injury to the commercial interests of the Pacific coast and of San Francisco in particular, took issue with the health authorities as to the disease being plague and their opposition, aided by a considerable portion of the press of the State, has continued until recently. In the meantime there have been ninety deaths from the disease in Chinatown, the fact of it being plague having been thoroughly established by post mortem examinations carried out under the direction of the United States Health and Marine Hospital Service.

"The menace to the public health consequent upon a *denial of the existence of plague in Chinatown*, when its presence there had been scientifically determined, was regarded with great concern by the conference of State and Provincial Boards of Health which held its annual meeting at New Haven last October. It was then determined to ask for the call of a conference by Surgeon-General Wyman of the United States Health and Marine Hospital Service to consider the situation.

"The conference, at which nineteen States were represented, including the State of New York, was held in Washington on the 19th of January, 1903. The surgeon-general read a detailed statement of the situation, and after a full discussion, the result of the deliberations was a declaration, unanimously approved by the conference, that the lack of harmony between the State and municipal health authorities in San Francisco and with the Federal authorities, constituted a serious menace to the public health. It was also agreed that with intelligent cooperation between the local and Federal authorities there would be practically for January—(*Concluded*)

Zymotic Diseases							Other Causes of Death										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	......	2	1	....	......	1	1	8	1	......	8	......
....	....	....	....	....	....	......	1	......	....	......	....	......	1	1	3	....	8
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	......
....	....	....	....	....	2	1	4	1	....	1	....	4	3	1	1	1	8
....	. ..	....	....	....	....	......	8	1	....	1	1	2	1	1	......	1	8
....	....	....	....	....	....	......	......	2	...	......	....	1	1	....	1	2	......
....	1	....	1	1	7	2	43	15	2	16	18	88	85	14	13	24	26
20	98	40	27	78	288	211	1,991	1,205	90	547	976	1,256	1,159	467	568	490	1,441
10	104	102	36	63	319	144	2,375	1,172	97	667	825	1,089	1,176	381	461	588	1,411

no danger of the spread of the disease beyond the part of the city known as Chinatown and that the disease there could be eradicated by intelligent action.

"It was further resolved that in case of the continued opposition of the State and city governments to the carrying out of the necessary measures against plague there would be rendered necessary a quarantine against San Francisco as a possible necessity in the future.

"Since the proceedings of the Washington conference have been received in California, both State and city authorities have promptly accepted the recommendations of the conference, and I have in my possession copies of telegrams from various sources in that State showing that the most cordial cooperation is now extended to the Federal authorities in every measure which has been recommended for the eradication of the epidemic.

"It is not deemed necessary under the circumstances to consider for a moment the institution of quarantine restrictions against San Francisco and there is no reason for any public alarm from the situation, now that the existence of the plague there has been universally admitted and is being properly treated from a sanitary standpoint.

"For the information of the honorable members of the Assembly, a copy of General Wyman's statement of the situation, together with the findings of the sanitary conference at Washington, are attached to this report.

"Respectfully submitted.

"DANIEL LEWIS,
"*Commissioner of Health.*"

Typhoid Fever at Ithaca—For the last two or three years Ithaca has had an autumnal prevalence of typhoid fever. About the middle of January began a winter outbreak, abrupt in its origin, universal in distribution, save the university and certain new parts of the city, and extensive, several hundred cases occurring within a few weeks. Measured by fatality the type is mild, but the Widal test shows its nature. To account for this epidemic, extraordinary from its characteristics as noted, speedy inquiry eliminated the unusual causes and established the well-nigh universal one of an infected water supply as the distributing source. By what means either of the three small streams furnishing this became infected thus to produce this abrupt, unseasonable outbreak, has not been determined to full satisfaction; but, of unusual conditions, there was encamped upon the ravine-like banks of one a body of foreign laborers during the fall and early winter building a dam, who departed with advent of frost, which suspended further work. Among them, now past the possibility of verifying, were probably carriers of typhoid germs, which the first soft weather carried into the stream. No case has been found among the permanent residents of the watershed, but the stream is one with every facility for infection. The university campus, which escapes, is not supplied from this stream. It can be confidently said that avoidance of the use of the public water unsterilized will protect the people from infection; atmospheric infection with typhoid fever is impossible. A speedy termination of the epidemic, is from analogy, to be anticipated.

MONTHLY BULLETIN OF THE NEW YORK STATE

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes.	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
MARITIME DISTRICT Totals	4,052,875	6,470	20.8	1,760	27.2	777	87	17	45	6
CITY OF NEW YORK Totals	3,732,903	6,014	20.8	1,682	28.0	655	90	16	44	5
BOROUGH OF MANHATTAN	1,917,676	3,280	22.3	1,006	30.7	315	93	8	18	2
BOROUGH OF THE BRONX	268,341	433	20.5	88	20.3	50	100	3	....	....
BOROUGH OF BROOKLYN	1,291,597	1,977	19.8	513	26.0	236	90	5	20	1
BOROUGH OF QUEENS	182,681	230	17.3	61	26.5	34	91	....	4	2
BOROUGH OF RICHMOND	72,608	94	16.8	14	15.5	20	75	....	2	....
Oyster Bay	16,334	45	......	6	13.3	14	45	....	....	....
Hempstead	27,066	32	15.5	6	19.0	10	......	....	....	....
North Hempstead	12,048	16	......	3	18.5	3	......	....	....	....
Southold	8,301	9	......	1	11.1	6	......	....	....	....
Sag Harbor	3,500	8	......	3	37.5	2	125	....	....	....
Huntington	9,483	7	......	2	......	1	......	....	....	....
Brookhaven	14,592	26	......	2	7.7	15	......	....	....	....
YONKERS	50,000	56	13.4	11	19.6	10	56	....	....	....
Greenburgh	15,564	24	......	3	12.5	6	125	....	....	....
MOUNT VERNON	20,346	21	13.5	7	33.3	3	90	1	....	....
Port Chester	7,440	....	......	....	......	....	......	....	....	....
Ossining	7,939	10	......	2	20.0	1	......	....	....	....
NEW ROCHELLE	14,720	17	......	4	23.5	1	60	....	1	....
Peekskill	10,358	15	......	3	20.0	4	......	....	....	....
White Plains	7,900	11	......	5	45.5	1	......	....	....	....
Rest of District	94,332	159	21.5	20	12.5	45	35	....	....	1
HUDSON VALLEY DIST. Totals	696,000	1,005	18.8	193	19.2	242	57	1	19	1
ALBANY	100,000	156	20.0	31	20.0	29	58	....	5	....
COHOES	24,000	51	27.6	19	40.0	3	200	....	3	....
TROY	75,057	107	18.0	26	25.0	12	25	1	1	....
WATERVLIET	14,821	20	......	3	15.0	3	100	....	1	....
Green Island	4,770	3	......	1	33.3	1	333	....	....	....
Hoosick Falls	5,671	9	......	1	11.1	2	......	....	....	....
RENSSELAER	7,466	18	......	2	11.1	5	165	....	1	....
Coxsackie	4,102	2	......	0	......	1	......	....	....	....
Catskill	5,486	8	......	2	25.0	2	......	....	....	....
HUDSON	9,528	19	......	7	40.0	2	50	....	1	....
KINGSTON	24,535	35	18.5	10	28.5	4	143	....	....	1
Ellenville	3,000	5	......	1	20.0	2	200	....	....	....
Marbletown	3,511	4	......	1	25.0	2	......	....	....	....
Rosendale	6,278	3	......	0	......	0	......	....	....	....
Esopus	4,907	10	......	0	......	0	100	....	....	....
Saugerties	3,700	10	......	2	20.0	4	......	....	....	....
POUGHKEEPSIE	24,029	45	24.5	11	24.5	10	155	....	3	....
Fishkill	13,016	22	......	3	13.6	3	......	....	....	....
Wappinger Falls	3,504	5	......	2	40.0	2	......	....	....	....
NEWBURGH	25,000	36	15.5	5	14.0	9	......	....	...	....
Port Jervis	9,385	14	......	3	21.4	5	......	....	....	....
MIDDLETOWN	14,522	22	......	1	4.5	8	......	....	....	....
Warwick	6,403	13	......	1	7.5	5	150	....	1	....
Goshen	4,564	7	......	2	28.5	1	140	....	....	....
Montgomery	5,939	4	......	0	......	0	......	....	....	....
Haverstraw	9,874	18	......	6	33.3	2	110	....	....	....
Nyack	4,275	5	......	1	20.0	1	......	....	....	....
Ramapo	7,502	16	......	6	37.5	2	......	....	....	....
Rest of District	271,800	338	16.0	46	13.5	122	30	....	3	....

DEPARTMENT OF HEALTH—VOLUME XIX

districts, cities, villages and towns during February, 1903

villages in *italic* and towns in Roman type.]

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	73	44	26	35	183	138	1,418	784	58	270	561	601	508	241	291	116	1,060
....	70	44	23	34	179	135	1,349	732	57	237	530	535	441	220	264	87	1,012
....	35	31	16	15	89	92	768	357	32	137	271	286	235	112	152	37	587
....	17	5	....	1	14	5	74	124	4	13	22	31	25	14	15	11	55
....	16	7	7	15	65	34	430	217	19	77	200	186	158	80	75	35	330
....	2	1	....	3	8	2	58	22	2	8	22	24	17	7	14	2	32
....	....	....	....	....	3	2	19	12	....	2	15	8	6	7	8	2	8
....	....	....	1	....	1	....	6	4	1	4	3	6	4	2	5	3	5
....	....	....	....	....	....	....	8	4	....	2	2	4	1	3	1	5	2
....	....	....	....	....	....	....	2	3	....	1	1	....	4	....	2	....	3
....	....	....	....	....	....	....	1	....	....	....	1	4	1	....	....	1	1
....	....	....	....	1	....	....	2	2	....	....	1	1	....	1	....	....	....
....	....	....	....	....	....	....	4	1	....	1	....	....	1	....	....	....	....
....	....	....	....	....	....	....	5	1	....	1	3	4	8	1	2	3	3
....	....	....	1	....	2	....	3	8	....	3	4	4	8	1	8	2	12
....	2	....	....	....	....	1	3	1	....	2	1	3	6	2	....	1	2
....	....	....	....	....	....	1	2	4	....	....	1	1	6	....	2	1	2
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	4	....	3	....	....	3
....	....	....	....	....	....	....	3	3	....	1	3	....	3	....	....	....	3
....	....	....	....	....	....	....	3	....	....	4	3	1	2	....	....	1	1
....	....	....	....	....	....	....	6	....	....	....	....	1	2	....	....	....	2
....	1	....	1	....	1	1	21	21	....	14	8	33	21	8	7	12	9
....	4	....	3	12	9	8	175	110	4	68	69	138	137	39	57	51	100
....	2	....	....	4	....	2	32	14	....	16	19	38	6	2	11	3	11
....	....	....	....	2	....	1	11	5	....	2	....	4	6	2	4	....	8
....	....	....	....	....	....	1	21	16	....	3	5	12	15	5	8	1	18
....	....	....	....	....	....	....	7	2	....	1	1	2	2	1	1	1	....
....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	1	....
....	....	....	....	....	....	....	1	1	....	....	....	3	1	....	....	1	2
....	....	....	1	....	1	....	4	3	....	....	....	....	5	....	....	1	2
....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	....
....	....	....	....	....	....	....	2	1	....	....	....	2	3	....	....	....	....
....	....	....	....	....	....	1	2	3	....	4	....	2	2	....	2	1	2
....	....	....	1	1	1	....	6	6	....	1	4	4	4	1	....	....	4
....	1	....	....	....	....	....	1	....	....	....	....	2	....	....	....	....	1
....	....	....	....	....	....	....	....	....	....	1	2	....	1	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	2
....	....	....	....	....	1	....	3	....	....	1	2	3	....	....	....	....	....
....	....	....	....	....	....	1	....	....	....	1	1	2	5	....	....	....	1
....	1	....	....	....	2	....	6	3	1	1	1	3	2	2	3	2	9
....	....	....	....	....	....	....	5	3	....	....	1	2	1	2	5	....	3
....	....	....	....	....	....	....	2	1	....	....	....	....	....	....	....	....	2
....	....	....	....	....	....	....	5	6	1	2	5	2	6	2	2	3	2
....	....	....	....	....	....	....	1	1	....	1	....	1	3	1	2	1	3
....	....	....	....	....	....	....	3	1	....	3	1	4	4	3	1	2	....
....	....	....	....	1	....	....	2	1	....	....	....	4	1	....	....	3	....
....	....	....	....	....	1	....	1	1	....	....	1	2	1	....	....	....	....
....	....	....	....	....	....	....	....	1	....	1	....	....	1	1	....	....	....
....	....	....	....	2	....	....	5	1	....	....	1	2	1	....	4	....	2
....	....	....	....	....	....	....	1	1	....	1	....	....	1	1	....	....	....
....	....	....	....	....	....	....	3	2	....	1	1	1	2	....	2	....	....
....	....	....	1	1	3	2	50	36	2	28	24	43	63	16	12	30	24

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
ADIRONDACK AND NORTHERN DISTRICT										
Totals	394,772	417	14.0	78	18.7	126	78	2	8	....
WATERTOWN	21,700	26	15.5	5	19.0	4	230	....	2	....
Ellisburg	3,888	6	......	1	16.6	2	166	....	1	....
Cape Vincent	2,882	1	......	0	......	1	......	....	....	....
Clayton	4,313	6	......	1	16.6	2	166	....	....	....
OGDENSBURG	12,633	25	25.0	5	20.0	1	40	....	....	....
Gouverneur	6,000	12	24.0	2	16.6	3	250	....	1	....
Potsdam	3,843	2	......	1	50.0	1	......	....	....	....
Canton	6,387	7	......	0	......	6	......	....	....	....
Malone	5,935	12	......	1	8.5	2	......	....	....	....
Plattsburg	8,434	11	17.0	2	18.2	3	90	....	....	....
Glens Falls	12,613	15	15.0	2	13.3	2	......	....	....	....
Whitehall	4,377	1	......	0	......	0	......	....	....	....
Fort Edward	5,216	5	......	0	......	3	......	....	....	....
Sandy Hill	4,473	8	......	1	12.5	2	......	....	....	....
Granville	5,217	2	......	0	......	1	......	....	....	....
Greenwich	4,172	3	......	0	......	0	......	....	....	....
Lowville	3,746	4	......	0	......	1	......	....	....	....
Rest of District	279,000	271	12.0	57	21.0	92	67	2	4	....
MOHAWK VALLEY DIST.										
Totals	420,000	518	16.0	105	20.0	136	107	1	9	....
SCHENECTADY	47,625	54	15.0	20	37.0	11	200	....	2	....
Cobleskill	3,973	6	......	0	......	1	......	....	....	....
AMSTERDAM	20,929	58	36.0	24	41.3	7	205	....	....	....
Fort Plain	2,444	4	......	0	......	1	......	....	....	....
JOHNSTOWN	10,130	10	......	1	10.0	4	100	....	1	....
GLOVERSVILLE	18,349	12	......	1	8.3	2	83	....	1	....
LITTLE FALLS	10,381	2	......	0	......	0	......	....	....	....
Herkimer	5,555	3	......	2	66.6	0	......	....	....	....
Ilion	5,138	11	......	3	27.3	3	90	....	1	....
UTICA	56,383	83	18.5	17	20.5	19	60	1	1	....
Whitestown	6,235	6	......	1	16.6	0	......	....	....	....
ROME	15,343	17	14.5	2	11.6	5	......	....	....	....
Boonville	3,332	3	......	1	33.3	1	......	....	....	....
Camden	3,745	8	......	2	25.0	2	125	....	1	....
Waterford	6,157	6	......	2	33.3	2	......	....	....	....
Mechanicville	4,695	4	......	0	......	0	......	....	....	....
Ballston Spa	3,923	5	......	1	20.0	1	......	....	....	....
Saratoga Springs	12,409	15	......	2	13.3	4	133	....	....	....
Rest of District	183,250	211	14.3	26	12.5	73	100	....	2	....
SOUTHERN TIER DISTRICT										
Totals	429,530	500	15.0	93	19.0	153	60	3	8	....
BINGHAMTON	39,647	48	15.5	4	8.5	11	25	....	1	....
Owego	5,039	5	......	1	20.0	2	......	....	....	....
Candor	3,330	8	......	0	......	4	......	....	....	....
Waverly	4,465	11	......	2	9.0	1	90	....	....	....
ELMIRA	35,672	42	15.2	8	19.0	7	50	1	1	....
Horseheads	4,944	......	......	......	......	......	......	....	....	....
HORNELLSVILLE	12,000	11	......	4	36.4	2	90	....	1	....
Bath	5,000	1	......	1	......	0	......	....	....	....
CORNING	11,061	14	16.5	3	21.4	2	......	....	....	....
Wellsville	5,000	8	......	0	......	3	......	....	....	....
OLEAN	9,462	8	......	3	37.5	1	125	....	....	....
Salamanca	4,251	2	......	1	50.0	0	......	....	....	....
DUNKIRK	11,616	9	......	2	22.2	2	111	....	1	....

FOR FEBRUARY—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
1	1	3	2	2	12	......	73	30	5	34	30	53	44	14	14	39	50
1	....	....	....	....	3	......	2	1	1	4	1	3	1	1	2	....	4
....	....	....	....	....	....	......	......	......	....	......	....	1	1	....	......	2	1
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	1	....
....	....	....	....	....	1	......	......	......	....	......	....	1	3	....	......	....	1
....	1	....	....	....	....	......	6	2	1	2	1	4	2	....	1	....	5
....	....	2	....	....	....	......	2	1	....	......	....	4	1	....	......	....	....
....	....	....	....	....	....	......	1	......	....	......	....	......	1	....	......	....	....
....	....	....	....	....	....	......	1	......	....	......	2	3	......	....	......	1	....
....	....	....	....	....	....	......	......	3	....	......	2	1	2	2	......	1	1
....	....	....	1	....	....	......	2	......	....	2	1	3	2	....	......	....	....
....	....	....	....	....	....	......	2	1	1	2	1	2	2	....	1	1	2
....	....	....	....	....	....	......	......	......	....	......	....	1	......	....	......	....	....
....	....	....	....	....	....	......	2	......	....	......	....	1	......	....	......	2	....
....	....	....	....	....	....	......	1	2	....	1	....	1	1	1	......	....	1
....	....	....	....	....	....	......	1	......	....	......	....	......	......	....	......	1	....
....	....	....	....	....	....	......	......	......	1	......	1	......	......	....	......	....	1
....	....	....	....	....	....	......	1	1	....	......	....	1	......	1	......	....	....
....	....	1	1	2	8	......	52	19	1	23	20	27	28	9	10	30	34
2	21	1	....	3	13	5	70	51	2	21	31	59	86	22	31	45	45
....	....	1	....	....	7	1	6	7	....	4	4	3	8	2	3	2	4
....	....	....	....	....	....	......	......	2	....	......	1	......	......	2	......	1	....
....	11	....	....	....	....	1	8	1	1	1	2	7	12	2	2	2	8
....	....	....	....	....	....	......	......	......	....	......	1	1	1	....	......	1	....
....	....	....	....	....	....	......	1	......	....	......	2	2	2	1	......	1	....
....	....	....	....	....	....	......	1	3	....	2	1	......	......	....	1	2	1
....	....	....	....	....	....	......	......	......	....	1	....	......	......	....	1	....	....
....	....	....	....	....	....	......	1	......	....	......	1	......	1	....	......	....	....
....	....	....	....	....	....	......	2	2	....	......	1	......	2	....	......	2	1
1	....	....	....	....	1	1	14	10	....	3	5	11	15	4	4	6	6
....	....	....	....	....	....	......	1	1	....	2	....	......	1	....	1	....	....
....	....	....	....	....	....	......	1	2	1	......	....	1	2	....	3	1	6
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	1	1	1
....	....	....	....	....	....	......	2	1	....	......	....	1	......	1	......	1	1
....	....	....	....	....	....	......	2	1	....	......	....	......	2	1	......	....	....
....	....	....	....	....	....	......	......	1	....	......	1	1	1	....	......	....	....
....	....	....	....	....	....	......	......	2	....	......	....	......	1	....	2	....	....
....	....	....	....	1	....	1	1	2	....	......	2	2	3	1	1	1	....
1	10	....	....	2	5	1	30	16	....	8	10	30	35	8	12	24	17
....	5	1	1	7	1	2	54	25	6	33	29	87	75	24	27	47	65
....	....	....	....	....	....	......	8	7	1	2	4	4	8	8	1	5	4
....	....	....	....	....	....	......	......	......	....	......	1	......	1	1	......	1	1
....	....	....	....	....	....	......	1	......	....	......	1	3	......	1	......	2	....
....	2	....	....	....	....	......	2	1	....	1	....	1	2	....	1	....	1
....	....	....	....	....	....	......	1	8	1	6	2	11	5	2	1	8	5
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	....
....	....	....	....	....	....	......	1	1	....	2	....	......	2	1	......	1	2
....	....	....	....	....	....	......	......	......	....	......	....	......	1	....	......	....	....
....	....	....	....	....	....	......	1	......	....	......	1	4	2	1	2	1	2
....	....	....	....	....	....	......	1	......	....	1	1	4	......	....	......	1	....
....	1	....	....	....	....	......	......	1	....	......	....	2	1	....	2	....	1
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	2
....	....	....	....	....	....	......	1	......	1	......	....	1	1	1	......	....	

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
SOUTHERN TIER DISTRICT —(*Continued*)										
JAMESTOWN	22,892	25	14.2	7	28.0	4	80	....	1	....
Westfield	2,480	7	......	0	......	2	140	....	....	....
Fredonia	4,125	5	......	1	20.0	1	......	....	....	....
Rest of District	248,600	296	15.0	56	19.0	111	58	2	3	....
EAST CENTRAL DISTRICT Totals	403,000	424	14.0	88	20.7	133	54	....	4	....
SYRACUSE	108,374	118	14.0	31	26.3	19	115	....	2	....
Baldwinsville	3,000	1	......	0	......	1	......	....	....	....
DeWitt	5,435	10	......	1	10.0	3	......	....	....	....
Cortland	9,014	13	......	3	23.0	5	......	....	....	....
Homer	2,381	7	......	2	28.5	3	142	....	1	....
ONEIDA	7,942	5	......	2	40.0	0	......	....	....	....
Hamilton	3,744	6	......	1	16.7	2	......	....	....	....
Cazenovia	3,830	....	......	....	......	...	......	....	....	....
Canastota	3,300	0	......	0	......	0	......	....	....	....
Norwich	5,766	2	......	1	50.0	0	......	....	....	....
Oneonta	7,147	8	......	1	12.5	3	125	....	....	....
Worcester	2,409	1	......	1	......	0	......	....	....	....
Cooperstown	2,368	2	......	1	50.0	1	500	....	....	....
Walton	4,869	5	......	0	......	3	......	....	....	....
Delhi	3,248	3	......	0	......	1	....	....	....	....
Liberty	4,568	6	......	0	......	0	......	....	....	....
Rest of District	225,540	237	14.0	44	18.5	92	35	....	1	....
WEST CENTRAL DISTRICT Totals	320,600	384	15.0	37	9.5	122	110	2	31	1
AUBURN	35,000	33	12.3	5	15.2	7	30	....	1	....
ITHACA	13,136	57	......	1	2.0	7	510	....	27	....
Hector	4,137	4	......	0	......	2	......	....	....	....
Waterloo	4,256	3	......	0	......	1	......	....	....	....
Seneca Falls	6,519	8	......	1	12.5	0	......	....	....	....
GENEVA	10,433	9	......	3	33.3	3	111	1	....	....
Canandaigua	6,151	6	......	1	16.6	2	......	....	....	....
Manchester	4,733	4	......	0	......	1	......	....	....	....
Phelps	4,788	3	......	1	33.3	0	333	....	....	....
Penn Yan	4,650	5	......	2	40.0	2	......	....	....	....
Batavia	9,180	7	......	1	14.2	3	......	....	....	....
Dansville	3,633	5	......	0	......	1	......	....	....	....
Le Roy	3,144	4	......	1	25.0	1	250	....	1	....
Warsaw	4,341	5	......	1	20.0	1	......	....	....	....
Rest of District	206,500	231	14.5	20	8.5	91	45	1	2	1
LAKE ONTARIO AND WESTERN DISTRICT Totals	898,819	1,108	16.0	250	22.5	267	80	3	27	....
BUFFALO	370,000	474	17.0	118	24.5	73	110	....	14	....
Tonawanda	7,421	8	......	4	50.0	3	125	....	....	....
Amherst	4,223	5	......	0	......	0	......	....	....	....
NORTH TONAWANDA	9,069	8	......	4	50.0	0	......	....	....	....
LOCKPORT	16,581	20	13.0	6	30.0	4	50	....	....	....
NIAGARA FALLS	19,457	45	29.5	12	26.5	5	265	....	8	....
Medina	4,716	6	......	3	50.0	2	......	....	....	....
Albion	4,477	9	......	0	......	4	......	....	....	....
Brockport	3,400	5	......	0	......	2	......	....	....	....
ROCHESTER	162,608	178	14.3	38	21.5	46	40	2	....	....
Palmyra	3,758	7	......	0	......	6	......	....	....	....

for February—(*Continued*)

Zymotic Diseases							Other Causes of Death										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	1	....	1	....	....	8	2	1	2	1	4	1	8
....	....	....	....	....	....	1	....	1	....	1	1	2	1	....	....	....	....
....	....	....	....	....	....	....	....	....	....	2	....	....	1	....	1	....	1
....	2	1	1	7	....	1	87	11	3	15	16	54	48	13	15	82	85
....	2	8	....	7	5	8	60	31	2	87	22	55	62	20	20	48	48
....	....	1	....	5	4	1	15	12	1	6	8	13	13	8	7	7	15
....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	2	....	....	....	1	....	8	....	8	1	....
....	....	....	....	....	....	....	4	2	....	2	1	8	....	....	1	....	....
....	....	....	....	....	....	....	1	....	....	....	....	1	1	1	....	....	2
....	....	....	....	....	....	....	1	1	....	....	....	....	2	....	....	....	1
....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	2	1	1
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....
....	....	....	....	1	....	....	....	....	....	....	....	1	2	1	1	1	1
....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	1	....	1	....	....	1	....	....	2	....
....	....	....	....	....	....	....	....	1	....	....	....	2	....	....	....	....	....
....	....	....	....	....	....	....	1	8	....	....	....	....	....	....	....	....	2
....	2	2	....	1	1	1	33	11	1	26	12	85	89	9	6	81	26
....	2	....	3	1	3	....	52	28	2	85	14	50	64	18	19	86	28
....	....	....	....	....	....	....	8	5	....	8	....	4	6	....	1	1	4
....	2	....	....	....	....	....	8	1	....	4	4	6	4	....	1	2	3
....	....	....	....	....	....	....	1	....	....	....	....	1	1	....	1	....	....
....	....	....	....	....	....	....	....	....	....	1	....	1	1	....	....	....	....
....	....	....	....	....	....	....	1	8	....	....	1	1	1	1	....	....	....
....	....	....	....	....	....	....	2	2	....	1	....	....	....	1	1	1	....
....	....	....	....	....	....	....	2	....	....	....	....	....	8	1	....	....	....
....	....	....	....	....	....	....	1	....	....	1	....	2	....	....	....	....	....
....	....	....	....	....	1	....	....	1	....	....	....	1	....	....	....	....	....
....	....	....	....	....	....	....	1	....	....	1	....	....	1	....	....	1	1
....	....	....	....	....	....	....	2	....	....	1	....	1	....	....	1	1	1
....	....	....	....	....	....	....	....	1	....	....	....	2	....	....	2	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	2
....	....	....	....	....	....	....	1	1	....	....	....	1	....	....	....	1	1
....	....	....	8	1	2	....	80	14	2	23	9	80	47	10	12	28	16
....	6	8	2	7	14	25	169	101	10	68	73	131	168	49	58	82	127
....	2	8	2	6	8	17	72	43	7	28	35	49	57	24	24	21	62
....	....	....	....	1	....	....	2	....	....	1	1	1	....	....	....	1	1
....	....	....	....	....	....	....	1	....	....	....	1	1	1	....	....	1	....
....	....	....	....	....	....	....	....	....	1	....	1	2	2	....	....	....	2
....	....	....	....	....	1	....	7	8	....	....	....	2	5	....	....	1	1
....	3	....	....	....	....	2	6	5	....	8	2	3	2	2	3	8	5
....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	....	....	8
....	....	....	....	....	....	....	1	1	....	....	1	2	....	1	....	8	....
....	....	....	....	....	....	....	....	....	....	....	1	1	1	....	....	1	1
....	....	....	....	....	2	8	26	17	1	11	11	23	29	12	8	16	17
....	....	....	....	....	....	....	2	....	....	1	....	....	....	1	1	2	....

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
LAKE ONTARIO AND WESTERN DIST.—(*Con.*)										
Newark..........................	4,578	6	......	1	16.6	0	166	....	....	....
Lyons	5,824	5	......	1	20.0	2	......	....	....	....
Clyde	2,507	6	......	3	50.0	0	......	....	....	....
OSWEGO..........................	22,200	27	16.0	4	15.0	7	......	....	....	....
FULTON	8,734	13	......	2	15.3	3	......	....	....	....
Richland..........................	8,535	1	......	0	......	0	......	....	....	....
Rest of District..........................	244,184	281	15.0	54	20.0	108	45	1	5	....
Totals for the State.......	7,910,600	10,826	18.0	2,604	23.1	1,957	82	29	151	8
Average for past five years	....	10,492	18.7	2,712	25.8	2,244	90	47	110	17

REMARKS—During the first two weeks of the month the weather was warm continuing from mild weather of January, with mean temperatures seldom reaching the freezing point except in the northern part of the State. The third week of the month was universally cold with minimum temperature below zero; rising temperatures followed during the last week. At all points the mean temperature for the month was two to four degrees above the average and in thirty years there have been few Februarys with a higher mean. There was a slight deficiency in the precipitation. The number of days on which rain fell was 8 in the Eastern part of the State and from 14 to 21 at the Northern and Western stations. On the average, one-fourth of the days were clear.

SEWER SYSTEMS OUTSIDE INCORPORATED VILLAGES OR CITIES—[Ch. 348. L. 1901.] The substance of this law concerning which frequent inquiry is made is here given for general information.

Section 1. The town board of any town on the petition of a majority of the owners of real property in a proposed district, representing a majority of the taxable property therein, as appears by the last preceding completed assessment-roll, may establish a sewer system outside a village or city. The petition must describe the proposed district, and state the maximum amount proposed to be expended in the construction of such sewer system. Each petitioner shall state opposite his name the assessed valuation of the real property owned by him in such district according to the last preceding completed assessment-roll. The petition must be signed by the petitioners and acknowledged in the same manner as a deed to be recorded. There shall be annexed to and presented with such petition a map and plan of the proposed sewer system with specifications of dimensions and connections, and outlet or sewage disposal works prepared by a competent engineer at the expense of the petitioners.

§ 2. If the town board is satisfied that the petitioners are a majority of the owners of real property in the proposed district, and own a majority in value of the taxable property therein, they shall make an order establishing such district and appointing three taxpayers therein as sewer commissioners, who shall hold their offices at the pleasure of the town board.

§ 3. Provides that commissioners shall take oath of office and file official undertaking.

§ 4. The sewer commissioners shall cause a copy of the map and plan of the proposed sewer system to be submitted to the state department of health, and if approved, it shall be filed in its office. Such map and plan may be amended with the approval of the state department of health, and if amended, it shall be filed in the office of the state department of health and of the town clerk.

§ 5. The sewer commissioners of such district shall advertise for proposals for the construction of a sewer system according to such map and plan, either under an entire contract or in parts or sections as the board may determine. Such advertisement shall be published once in each of two successive weeks in each newspaper published in the town, and if no newspaper is published therein in two newspapers published in a city or village nearest to such town. The commissioners may require a bond or a deposit from each person submitting a proposal, FOR FEBRUARY—(*Concluded*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	1	....	....	....	....	......	2	1	....	......	....	......	1	1	......	....	......
....	....	....	....	....	....	......	1	1	....	......	....	1	1	....	......	....	1
....	....	....	....	....	....	......	2	1	....	1	....	......	......	....	1	....	1
....	....	....	....	....	....	......	2	8	....	4	2	8	6	1	2	....	4
....	....	....	....	....	....	......	......	2	....	......	8	1	8	....	1	1	2
....	....	....	....	....	....	......	......	......	....	......	1	......	......	....	......	....	......
....	1	....	....	....	8	8	46	23	1	18	14	40	44	7	18	80	27
3	114	55	87	74	240	181	2,071	1,160	89	566	829	1,174	1,124	422	517	459	1,528
17	118	113	42	68	273	147	2,200	1,119	92	608	809	992	1,146	354	416	584	1,270

the liability on such bond to accrue, or such deposit to be forfeited to the town, in case such person shall refuse to enter into a contract in accordance with his proposal. The commissioners may accept or reject any or all proposals, and shall let the contract to the lowest bidder. No contract shall be made by which a greater amount shall be agreed to be paid than the maximum amount stated in the petition for the construction of such sewer, including the expense of superintendence and inspection as provided in section six hereof. Each contract shall be executed in duplicate one of which shall be given to the contractor and the other shall be filed in the office of the town clerk.

§§ 6 and 7. Empower the commissioners to employ a superintendent of construction and inspectors, and to acquire necessary real property by condemnation.

§ 8. The sewer commissioners shall prepare and file in the office of the town clerk a map and plan of such district which shall show the highways and the several parcels of land therein. The expense of the construction of such sewer shall be apportioned by such commissioners on the lands within such district in proportion as nearly as may be to the benefit which each lot or parcel will derive therefrom. After making such appointment the board shall serve on each landowner a notice of the completion thereof and of the filing of such map and plan, and that at a specified time and place a hearing will be had to consider and review the same. Such notice must be served at least six days before the hearing, personally, if such land owner can with reasonable diligence be found within the state, otherwise by mail addressed to the landowners' last known post office address. The commissioners shall meet at the time and place specified to hear objections to such apportionment, and may modify and correct the same. The sewer commissioners upon the completion of such apportionment shall file the same in the office of the town clerk. The apportionment shall be deemed final and conclusive unless an appeal is taken therefrom within fifteen days after the filing thereof.

§§ 9 to 13. Provide for appeal from the apportionment to the county court and for reapportionment if reversed, and by commissioners appointed by the court if found erroneous or inequitable, the costs to be borne by the sewer district.

§§ 14 to 16. Directs the sewer commissioners to assess the expense of construction on the property benefited in accordance with the apportionment established, and for all unpaid after 30 days the town board shall issue bonds, to be paid by the lots in default. The cost of maintenance shall be a charge upon the sewer district.

Chapters 545, Laws of 1893 and 328 of 1894, relating to town sewers, are repealed save as to pending action.

FEBRUARY MORTALITY—The death-rate increased over January from 17.0 to 18.0, the average daily mortality having risen from 361 to 386. *Grippe* caused doubtless 1500 deaths this month against 1200 in January. From pneumonia there were 1228 deaths against 1133 in January, and for Bright's disease 674 against 802. *Typhoid fever* has been excessive in both months, the epidemic at Ithaca which has abated, and one at West Seneca, near Buffalo, contributing largely. *Smallpox* caused but 3 deaths and very few new cases have been recently reported.

MONTHLY BULLETIN OF THE NEW YORK STATE

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
MARITIME DISTRICT Totals....................	4,052,875	6,539	18.9	1,951	30.0	669	101	21	45	7
CITY OF NEW YORK Totals....................	3,732,903	6,084	19.2	1,830	30.0	596	102	20	42	7
BOROUGH OF MANHATTAN..	1,917,676	3,440	21.1	1,102	32.0	279	98	15	18	2
BOROUGH OF THE BRONX ...	268,841	422	18.5	105	25.0	43	154	3	1	1
BOROUGH OF BROOKLYN....	1,219,597	1,898	17.3	534	26.7	223	96	2	20	3
BOROUGH OF QUEENS........	182,681	216	13.8	67	31.0	30	106	....	2	1
BOROUGH OF RICHMOND	72,608	108	17.5	22	20.2	21	78	....	1	....
Oyster Bay..................	16,834	8	......	3	28.5	4	142	....	....	....
Hempstead..................	27,066	37	16.0	8	21.6	10	......	....	....	....
North Hempstead...........	12,048	14	......	4	28.5	1	70	....	....	....
Southold	8,301	12	......	7	58.0	3	416	....	....	....
Sag Harbor	3,500	8	......	2	25.0	2	250	....	....	....
Huntington	9,483	16	......	2	12.5	3	......	....	....	....
Brookhaven	14,592	14	......	4	......	5	......	....	....	....
YONKERS....................	50,000	70	16.5	18	25.7	10	70	1	....	....
Greenburgh..................	15,564	26	......	9	34.5	5	115	....	....	....
MOUNT VERNON............	20,346	25	14.5	8	32.0	3	40	....	....	....
Port Chester...............	7,440	26	......	9	34.5	5	190	....	2	....
Ossining..................	7,939	10	.....	1	10.0	0	100	....	1	....
NEW ROCHELLE	14,720	14	......	7	50.0	1	......	....	....	....
Peekskill..................	10,858	11	......	3	27.3	2	190	....	....	....
White Plains...............	7,900	11	......	3	27.2	2	90	....	....	....
Rest of District............	94,382	153	18.7	33	22.0	37	60	....	....	....
HUDSON VALLEY DIST. Totals....................	696,000	1,100	18.6	189	17.3	315	75	5	20	3
ALBANY	100,000	175	20.6	28	16.0	37	80	....	1	....
COHOES	24,000	49	23.7	17	34.5	3	225	1	5	....
TROY........................	75,057	140	22.0	31	22.0	29	57	1	2	....
WATERVLIET	14,321	24	20.5	5	20.8	3	125	....	2	....
Green Island...............	4,770	5	......	0	......	2	......	....	....	....
Hoosick Falls..............	5,671	11	......	4	36.3	1	190	....	....	....
RENSSELAER................	7,466	13	22.0	1	7.5	2	165	....	....	....
Coxsackie....................	4,102	12	......	3	25.0	5	......	....	....	....
Catskill	5,486	5	......	3	60.0	1	......	....	....	....
HUDSON.....................	9,528	23	24.0	3	13.0	7	130	....	1	1
KINGSTON...................	24,535	30	15.0	7	23.3	4	183	1	1	....
Ellenville	3,000	5	......	1	20.0	2	......	....	....	....
Marbletown	3,511	1	......	0	......	1	......	....	....	....
Rosendale	6,278	7	......	2	28.5	1	......	....	....	....
Esopus	4,907	5	.....	0	......	0	......	....	....	....
Saugerties...................	8,700	1	......	0	......	1	......	....	....	....
POUGHKEEPSIE..............	24,029	39	19.1	7	18.0	8	50	....	1	....
Fishkill	13,016	16	......	4	25.0	4	62	....	....	....
Wappinger Falls............	3,504	5	......	1	20.0	2	200	....	....	....
NEWBURGH	25,000	63	25.0	8	15.0	20	20	....	....	....
Port Jervis.................	9,885	14	......	1	7.0	4	140	....	1	....
MIDDLETOWN................	14,522	19	16.0	4	21.0	5	210	....	....	....
Warwick.....................	6,403	7	......	1	14.2	2	......	....	....	....
Goshen	4,564	12	......	2	16.6	4	......	....	....	....
Montgomery.................	5,939	11	......	0	......	6	90	....	....	....
Haverstraw..................	9,874	13	......	2	15.5	3	155	....	1	1
Nyack	4,275	9	......	1	11.1	2	......	....	....	....
Ramapo	7,502	8	......	2	25.0	4	......	....	....	....
Rest of District	271,800	388	17.0	51	13.3	152	58	2	5	1

DEPARTMENT OF HEALTH—VOLUME XIX

districts, cities, villages and towns during March, 1903

villages in *italic* and towns in Roman type.]

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	83	49	29	50	211	166	1,369	781	68	280	598	665	487	250	260	104	1,016
....	83	47	28	36	205	157	1,286	784	65	249	568	617	429	285	240	84	952
....	40	34	18	11	101	98	778	389	34	189	290	398	280	141	146	88	526
....	28	4	2	1	19	6	62	105	2	12	26	21	28	12	17	14	58
....	12	9	8	18	76	44	391	206	24	88	211	173	129	71	66	24	323
....	3	....	....	5	8	4	41	15	4	4	24	25	32	7	4	5	32
....	....	....	....	1	1	5	14	19	1	6	17	6	10	4	7	3	18
....	....	....	....	....	....	1	....	1	....	....	....	....	....	1	....	3	2
....	....	....	....	....	....	....	12	2	2	1	4	4	3	8	2	....	4
....	....	....	....	....	....	1	2	....	1	3	....	....	1	....	2	....	4
....	....	....	....	4	....	1	2	....	....	1	....	1	2	....	....	....	1
....	....	....	....	2	....	....	1	....	....	....	1	1	....	....	....	2	1
....	....	....	....	....	....	....	2	2	....	2	....	2	2	2	1	....	3
....	....	....	....	....	....	....	2	1	....	4	2	....	....	....	....	1	4
....	....	....	1	....	2	1	12	11	....	8	4	12	5	8	2	1	7
....	....	1	....	1	1	....	6	....	....	4	2	....	4	....	1	2	4
....	....	....	....	....	....	1	2	2	....	3	2	3	2	....	1	1	3
....	....	....	....	1	3	....	3	1	....	....	1	3	2	....	1	2	2
....	....	....	....	....	....	....	1	5	....	....	1	....	2	....	....	....	....
....	....	....	....	....	....	....	2	1	....	1	1	1	1	....	1	....	6
....	....	....	....	....	....	2	2	1	....	....	....	3	1	....	....	1	1
....	....	1	....	....	....	....	2	....	....	....	....	1	4	....	....	1	2
....	....	....	....	6	1	2	27	20	....	4	12	17	28	6	9	6	15
1	3	2	3	20	9	10	175	127	11	73	66	187	132	44	51	76	127
1	2	....	2	6	2	....	29	21	3	10	22	84	9	5	12	8	8
....	....	....	....	3	2	....	10	2	1	5	1	2	7	....	3	....	7
....	....	....	1	1	2	1	28	25	....	8	6	15	10	6	5	6	23
....	....	....	....	1	....	....	3	7	....	1	....	1	3	1	1	2	2
....	....	....	....	....	....	....	....	1	....	1	1	....	....	....	....	2	....
....	....	....	....	2	....	....	1	2	....	....	1	....	1	1	....	1	2
....	....	....	1	1	....	....	2	1	....	1	2	....	2	....	....	1	2
....	....	....	....	....	....	....	2	3	....	....	....	1	2	....	....	2	3
....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	1	....	1
....	....	....	....	....	....	....	1	2	1	2	1	1	4	2	....	2	4
....	....	....	....	3	....	1	5	4	....	1	....	3	5	2	1	1	4
....	....	....	....	....	....	....	3	....	....	1	....	1	....	....	1	....	....
....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....
....	....	....	....	....	....	....	2	1	....	2	....	....	....	....	1	1	....
....	....	....	....	....	....	....	1	1	....	....	....	1	....	....	....	....	2
....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....
....	....	....	....	....	1	....	6	4	....	5	....	7	7	1	1	4	2
....	....	1	....	....	....	....	2	....	....	3	1	2	3	....	1	1	2
....	....	....	....	....	....	1	1	....	....	....	....	2	1	....	....	....	....
....	1	....	....	....	....	....	5	6	....	1	5	7	6	3	4	5	10
....	....	....	....	....	....	1	2	2	....	1	1	....	3	2	....	....	1
....	....	....	....	2	1	1	7	1	....	....	....	....	3	....	1	....	3
....	....	....	....	....	....	....	3	....	1	....	....	1	....	1	....	....	1
....	....	....	....	....	....	....	1	2	....	2	....	1	1	....	....	3	2
....	....	....	....	....	....	1	2	2	....	1	....	2	1	....	....	2	....
....	....	....	....	....	....	....	2	1	1	....	2	2	1	....	1	....	1
....	....	....	....	....	....	....	3	1	....	....	....	1	....	....	....	2	2
....	....	....	....	....	....	....	3	....	....	1	1	2	....	....	....	1	....
....	....	1	4	2	1	4	51	38	4	26	21	49	63	20	18	32	46

MONTHLY BULLETIN

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
ADIRONDACK AND NORTHERN DISTRICT Totals	394,772	514	15.5	90	17.6	148	55	3	14	....
WATERTOWN	21,700	38	20.6	4	10.5	6	185	1	5	....
Ellisburgh	3,888	6	......	1	16 6	1	......	....	....	....
Cape Vincent	2,882	5	......	1	20.0	1	......	....	....	....
Clayton	4,313	2	......	1	50.0	0	......	....	....	....
OGDENSBURGH	12,633	28	24.5	1	3.2	11	65	....	2	....
Gouverneur	6,000	8	......	2	25.0	1	375	1	1	....
Potsdam	3,843	8	......	0	......	2	......	....	....	....
Canton	6,387	6	......	3	50.0	0	166	....	1	....
Malone	5,935	7	......	4	57.0	1	......	....	....	....
Plattsburgh	8,434	8	......	2	25.0	1	125	....	....	....
Glens Falls	12,613	17	16.0	1	6.0	7	......	....	....	....
Whitehall	4,377	5	......	1	20.0	3	......	....	....	....
Fort Edward	5,216	8	......	1	12.5	4	......	....	....	....
Sandy Hill	4,473	6	......	1	16.6	0	......	....	....	....
Granville	5,217	9	......	3	33.3	1	......	....	....	....
Greenwich	4,172	9	......	1	11.1	1	......	....	....	....
Lowville	3,746	......	......	......	......	....	......	....	....	....
Rest of District	279,000	344	14.0	63	18.5	108	45	1	5	....
MOHAWK VALLEY DIST. Totals	420,000	607	16.6	107	17.6	192	60	2	8	....
SCHENECTADY	47,625	70	17.0	24	34.3	14	116	....	1	....
Cobleskill	3,973	3	......	0	......	2	......	....	....	....
AMSTERDAM	20,929	48	26.5	12	25.0	16	80	....	....	....
Fort Plain	2,444	5	......	0	......	2	......	....	....	....
JOHNSTOWN	10,130	15	......	2	......	7	......	....	....	....
GLOVERSVILLE	18,349	21	......	2	9.5	8	45	1	....	....
LITTLE FALLS	10,381	10	......	1	9.0	4	......	....	....	....
Herkimer	5,555	9	......	2	22.2	2	......	....	....	....
Ilion	5,138	7	......	0	......	1	......	....	....	....
UTICA	56,383	106	22.0	20	18.8	25	80	1	1	....
Whitestown	6,235	4	......	0	......	1	......	....	....	....
ROME	15,343	23	17.5	2	8.7	10	87	....	1	....
Boonville	3,332	18	......	3	16.6	4	......	....	....	....
Camden	3,745	5	......	1	20.0	2	......	....	....	....
Waterford	6,157	15	......	3	20.0	5	135	....	1	....
Mechanicville	4,695	11	......	3	27.2	3	90	....	1	....
Ballston Spa	3,923	4	......	0	......	2	......	....	....	....
Saratoga Springs	12,409	18	......	2	11.1	2	110	....	1	....
Rest of District	183,250	215	13.5	30	13.8	87	35	....	2	....
SOUTHERN TIER DIST. Totals	429,530	584	16.0	78	13.1	195	54	....	13	....
BINGHAMTON	39,647	46	13.5	7	15.2	14	......	....	....	....
Owego	5,039	5	......	0	......	1	......	....	....	....
Candor	3,330	3	......	0	......	0	......	....	....	....
Waverly	4,465	4	......	0	......	1	250	....	1	....
ELMIRA	35,672	54	17.8	9	16.6	9	111	....	2	....
Horseheads	4,944	6	......	1	16.6	3	......	....	....	....
HORNELLSVILLE	12,000	17	17.0	3	17.6	2	235	....	2	....
Bath	5,000	4	......	0	......	1	......	....	....	....
CORNING	11,061	16	......	0	......	4	125	....	1	....
Wellsville	5,000	10	......	0	......	4	......	....	....	....
OLEAN	9,462	13	......	2	15.3	4	......	....	....	....
Salamanca	4,251	8	......	3	37.5	2	......	....	....	....
DUNKIRK	11,616	12	......	6	50.0	1	83	....	....	....

FOR MARCH—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	2	2	....	2	3	4	74	55	5	38	31	56	63	28	21	51	62
....	1	....	....	....	....	......	3	1	....	3	2	3	6	3	2	3	5
....	....	....	....	....	....	......	1	1	....	1	1	......	2	....	......	....	......
....	....	....	....	....	....	......	1	......	....	1	....	2	......	....	......	....	1
....	....	....	....	....	....	......	......	1	....	1	....	......	......	....	......	....	......
....	....	....	....	....	....	......	5	1	....	2	1	6	3	2	......	4	2
....	....	1	....	....	....	......	1	1	....	1	....	......	1	....	1	....	......
....	....	....	....	....	....	......	......	......	1	1	....	......	3	1	......	1	1
....	....	....	....	....	....	......	2	......	....	......	....	......	......	....	......	....	3
....	....	....	....	....	....	......	3	2	....	......	....	......	......	1	......	....	1
....	....	....	....	....	....	1	......	......	....	......	....	......	1	....	1	2	3
....	....	....	....	....	....	......	2	2	....	2	....	4	1	2	1	2	1
....	....	....	....	....	....	......	1	1	....	1	....	......	......	....	......	1	1
....	....	....	....	....	....	......	......	......	....	1	....	3	......	1	......	2	1
....	....	....	....	....	....	......	......	1	1	......	....	1	......	1	1	....	1
....	....	....	....	....	....	......	3	2	....	......	2	1	......	....	1	....	......
....	....	....	....	....	....	......	1	......	....	2	1	1	1	1	......	....	2
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	......
....	1	1	....	2	3	3	51	42	3	22	24	35	45	16	14	36	40
....	4	2	1	4	9	5	87	62	5	38	44	83	81	25	29	52	66
....	....	2	....	....	2	3	10	9	....	5	....	4	5	5	6	3	15
....	....	....	....	....	....	......	1	......	....	......	....	......	1	1	......	....	......
....	4	....	....	....	....	......	9	7	....	5	3	5	3	2	2	3	5
....	....	....	....	....	....	......	......	......	....	......	....	3	1	....	......	1	......
....	....	....	....	....	....	......	2	......	....	1	4	3	4	....	......	1	......
....	....	....	....	....	....	......	1	2	....	1	4	2	5	1	1	....	3
....	....	....	....	....	....	......	1	......	....	1	1	3	2	....	......	1	1
....	....	....	....	....	....	......	3	......	2	......	....	......	3	1	......	....	......
....	....	....	....	....	....	......	......	1	....	2	2	1	1	....	......	....	......
....	....	....	....	1	4	1	14	9	1	9	8	21	11	3	4	5	13
....	....	....	....	....	....	......	......	......	....	1	1	......	......	....	1	1	......
....	....	....	....	1	....	......	3	1	....	1	....	2	4	1	2	3	4
....	....	....	....	....	....	......	3	......	2	......	1	5	5	1	......	1	2
....	....	....	....	....	....	......	......	......	....	......	....	1	1	1	......	2	......
....	....	....	....	1	....	......	3	3	....	......	1	2	2	....	......	3	......
....	....	....	....	....	....	......	3	2	....	......	....	1	......	....	......	....	4
....	....	....	....	....	....	......	......	......	....	......	....	1	1	....	......	2	......
....	....	....	....	....	1	......	5	2	....	......	4	1	1	....	2	1	......
....	....	....	1	1	2	1	30	26	....	12	15	30	31	9	11	25	19
....	2	3	3	6	3	1	79	31	9	47	41	77	71	36	43	59	60
....	....	....	....	....	....	......	9	3	1	6	2	3	10	2	3	4	4
....	....	....	....	....	....	......	......	3	....	......	....	3	......	....	......	1	......
....	....	....	....	....	....	......	......	......	....	......	....	......	......	1	......	....	3
....	....	....	....	....	....	......	......	2	....	......	....	1	......	....	......	....	......
....	....	3	....	....	1	......	11	3	....	4	6	7	3	4	4	2	4
....	....	....	....	....	....	......	......	......	....	......	....	1	1	1	1	3	......
....	....	....	....	1	1	......	2	2	....	2	....	4	3	....	......	....	......
....	....	....	....	....	....	......	......	......	....	1	1	1	......	....	......	1	......
....	....	....	1	....	....	......	3	......	1	......	2	3	......	1	2	1	3
....	....	....	....	....	....	......	2	1	....	1	....	1	......	....	......	3	2
....	....	....	....	....	....	......	......	1	....	2	....	3	2	....	4	....	1
....	....	....	....	....	....	......	......	1	....	......	....	......	2	....	......	....	6
....	....	....	....	....	1	......	2	......	....	1	....	1	3	2	......	....	2

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
SOUTHERN TIER DISTRICT —(*Continued*)										
JAMESTOWN	22,892	34	17.4	2	6.0	6	88	....	2	....
Westfield	2,430	4	......	1	25.0	0	250	....	1	....
Fredonia	4,125	6	......	2	33.3	3	......	....	....	....
Rest of District	248,600	342	16.0	42	12.0	140	35	....	4	....
EAST CENTRAL DISTRICT Totals	403,000	600	17.4	103	17.2	210	67	2	11	....
SYRACUSE	108,374	156	17.1	38	24.5	45	65	1	2	....
Baldwinsville	3,000	6	......	2	33.3	2	166	....	....	....
DeWitt	5,435	7	......	1	14.2	1	142	....	....	....
Cortland	9,014	24	......	4	16.6	11	......	....	....	....
Homer	2,381	2	......	0	......	1	......	....	....	....
ONEIDA	7,942	9	......	0	......	7	......	....	....	....
Hamilton	3,744	9	......	0	......	5	......	....	....	....
Cazenovia	3,330	10	......	2	20.0	2	......	....	....	....
Canastota	3,300	5	......	0	......	0	......	....	....	....
Norwich	5,766	14	......	3	21.4	3	......	....	....	....
Oneonta	7,147	7	......	2	28.5	2	142	1	....	....
Worcester	2,409	3	......	0	......	1	......	....	....	....
Cooperstown	2,368	2	......	0	......	1	......	....	....	....
Walton	4,869	2	......	0	......	0	500	....	1	....
Delhi	3,243	5	......	0	......	1	......	....	....	....
Liberty	4,568	9	......	0	......	3	......	....	....	....
Rest of District	225,540	330	17.0	51	15.5	125	30	....	8	....
WEST CENTRAL DISTRICT Totals	320,600	494	18.0	62	12.6	195	50	....	18	....
AUBURN	35,000	55	18.5	6	11.0	17	36	....	2	....
ITHACA	13,136	30	26.5	0	......	6	366	....	11	....
Hector	4,137	3	......	0	......	1	......	....	....	....
Waterloo'	4,256	6	......	1	16.6	2	......	....	....	....
Seneca Falls	6,519	9	......	0	......	4	......	....	....	....
GENEVA	10,483	15	......	3	20.0	3	67	....	1	....
Canandaigua	6,151	5	......	1	20.0	2	......	....	....	....
Manchester	4,733	12	......	1	8.5	4	......	....	....	....
Phelps	4,738	6	......	0	......	4	......	....	....	....
Penn Yan	4,650	4	......	0	......	0	......	....	....	....
Batavia	9,180	9	......	5	55.5	1	......	....	....	....
Dansville	3,633	3	......	0	......	1	......	....	....	....
Le Roy	3,144	6	......	1	16.6	2	......	....	....	....
Warsaw	4,341	4	......	3	75.0	1	......	....	....	....
Rest of District	206,500	337	18.0	41	12.5	147	32	....	4	....
LAKE ONTARIO AND WESTERN DISTRICT Totals	893,819	1,213	16.0	311	26.0	294	86	9	22	....
BUFFALO	370,000	504	16.0	154	31.0	75	120	4	11	....
Tonawanda	7,421	10	......	7	70.0	1	200	....	....	....
Amherst	4,223	4	......	1	25.0	2	......	....	....	....
NORTH TONAWANDA	9,069	10	......	4	40.0	0	100	....	....	....
LOCKPORT	16,581	29	......	8	27.5	10	35	....	....	....
NIAGARA FALLS	19,457	41	24.6	17	41.5	4	244	....	5	....
Medina	4,716	2	......	0	......	1	......	....	....	....
Albion	4,477	5	......	0	......	3	......	....	....	....
Brockport	3,400	8	......	2	25.0	3	125	....	1	....
ROCHESTER	162,608	192	14.0	29	15.0	50	25	1	....	....
Palmyra	3,758	8	......	2	25.0	3	125	....	....	....

FOR MARCH—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	1	....	....	....	....	....	2	3	1	2	2	4	3	2	8	6	3
....	....	....	....	....	....	....	1	1	....	....	1	....	....	....	....	....	....
....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	3	1
....	1	....	2	5	....	1	47	12	6	23	27	46	44	23	25	36	35
....	1	5	1	9	5	6	88	58	7	45	28	87	72	21	84	58	62
....	....	1	....	5	....	1	20	19	1	14	5	21	21	8	10	17	15
....	....	1	....	....	....	....	2	....	....	....	....	2	....	....	1	....	....
....	....	....	....	....	1	....	1	1	....	....	....	1	....	....	8	....	....
....	....	....	....	....	....	....	6	2	1	....	2	3	1	2	1	2	4
....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....
....	....	....	....	....	....	....	....	....	....	2	....	2	3	....	....	2	....
....	....	....	....	....	....	....	1	1	....	....	2	2	1	....	1	....	1
....	....	....	....	....	....	....	....	1	....	....	....	4	2	....	....	....	3
....	....	....	....	....	....	....	1	1	....	....	....	....	1	1	....	....	1
....	....	....	....	....	....	....	3	2	3	1	....	2	1	1	....	....	1
....	....	....	....	....	....	....	1	....	....	....	1	....	1	....	1	1	1
....	....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	1	....
....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....
....	....	....	....	....	....	....	....	1	....	....	....	....	1	2	....	....	1
....	....	....	....	....	....	....	2	4	....	....	....	2	....	....	....	1	....
....	1	3	1	4	4	5	51	25	2	23	17	46	38	12	17	34	34
....	....	1	2	....	....	8	71	89	3	33	34	65	78	22	29	49	47
....	....	....	....	....	....	....	12	5	....	2	....	10	6	6	1	7	4
....	....	....	....	....	....	....	6	2	....	2	....	2	1	3	2	....	1
....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	1	....
....	....	....	....	....	....	....	1	....	....	....	1	....	3	....	....	....	1
....	....	....	....	....	....	....	....	....	....	2	2	....	1	....	1	2	1
....	....	....	....	....	....	....	....	....	....	3	1	3	1	1	2	1	2
....	....	....	....	....	....	....	....	1	1	....	....	1	1	....	....	1	....
....	....	....	....	....	....	....	1	2	....	2	1	....	1	1	1	2	1
....	....	....	....	....	....	....	1	....	....	....	....	3	....	....	1	....	1
....	....	....	....	....	....	....	....	2	....	....	....	1	....	1	....	....	....
....	....	....	....	....	....	....	2	2	....	1	....	1	1	....	....	....	2
....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	1	....	....
....	....	....	....	....	....	....	1	....	....	1	....	3	....	....	....	1	1
....	....	....	....	....	....	....	1	....	....	1	....	1	1	....	....	....	....
....	....	1	3	....	....	8	46	25	2	23	29	39	57	10	19	34	33
1	5	6	4	18	11	27	164	107	9	85	73	187	178	52	70	85	150
1	1	2	3	14	7	19	73	45	4	27	23	50	69	24	36	25	67
....	....	....	....	2	....	....	3	1	....	....	....	....	3	....	....	....	1
....	....	....	....	....	....	....	1	....	....	2	....	....	....	....	....	....	1
....	....	....	....	1	....	....	1	1	....	....	....	2	3	....	....	....	2
....	1	....	....	....	....	....	5	1	....	3	1	2	3	....	2	4	7
....	3	....	....	....	1	1	5	4	....	4	....	1	5	1	2	3	6
....	....	....	....	....	....	....	1	....	....	....	....	....	1	....	....	....	....
....	....	....	....	....	....	....	2	....	....	1	....	....	1	1	....	....	....
....	....	....	....	....	....	....	....	1	....	....	2	1	....	....	....	1	2
....	....	....	....	....	1	8	22	19	2	21	20	33	24	11	8	15	12
....	....	1	....	....	....	....	1	....	....	1	....	1	2	....	....	1	1

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro spinal meningitis	Typhoid fever	Malarial diseases
LAKE ONTARIO AND WESTERN DIST.—(*Con.*)										
Newark	4,578	10	......	1	10.0	2	100	....	....	....
Lyons	5,824	12	......	2	16.6	3	......	....	....	....
Clyde	2,507	3	......	0	......	2	......	....	....	....
OSWEGO	22,200	30	16.0	5	16.6	8	133	....	3	....
FULTON	8,734	12	......	3	25.0	3	83	....	....	....
Richland	3,535	4	......	0	......	2	......	....	....	....
Rest of District	244,184	329	14.6	76	25.0	122	45	4	2	....
Totals for the State	7,910,600	11,651	17.5	2,891	25.7	2,298	68	42	151	10
Average for past 5 years	....	11,449	18.7	3,050	26.5	2,082	90	62	118	16

REMARKS—The month was phenomenal in respect to weather, the average mean temperature being ten degrees higher than the mean for March for the past thirty years; in no part of the State has a mean temperature been recorded as high as that of the present month within that period. The third week was especially warm with a mean temperature of 50 degrees all over the State, and maximum temperature approaching 80 degrees. There was a moderate excess of precipitation, more

FOR MARCH—(*Concluded*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	1	......	......	....	......	3	2	1	....	2	1	......
....	....	....	....	....	....	......	4	......	....	......	2	1	1	1	......	1	2
....	....	....	....	....	....	......	......	......	....	1	2	......	......	....	......	....	......
....	....	....	....	....	....	1	5	2	....	2	1	4	3	3	1	2	3
....	....	....	....	....	1	......	1	......	....	2	....	1	1	....	2	1	8
....	....	....	....	....	....	......	......	1	....	......	....	......	1	....	......	2	......
....	....	3	1	1	1	2	40	32	3	21	20	39	60	11	17	29	43
2	100	70	48	109	251	222	2,107	1,260	117	644	915	1,307	1,157	478	537	534	1,590
18	127	129	47	83	273	171	2,325	1,268	114	677	885	1,074	1,268	412	436	553	1,418

marked in the western part of the State, with an average of 6 clear days and of 18 on which rain fell. Wind movement was moderate.

Smallpox has nearly disappeared from the State. A few cases have been reported from Rochester and Buffalo, from rural towns in Cattaraugus and Delaware counties and in one lumber camp in Essex county a case direct from Montreal. There were but two deaths during the month.

MONTHLY BULLETIN OF THE NEW YORK STATE

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
MARITIME DISTRICT Totals	4,052,875	6,221	18.8	1,874	30.0	776	105	31	42	4
CITY OF NEW YORK Totals	3,732,903	5,771	18.8	1,793	31.0	694	110	29	40	4
BOROUGH OF MANHATTAN	1,917,676	3,268	20.6	1,050	32.1	376	103	24	19	....
BOROUGH OF THE BRONX	268,341	408	18.3	103	25.0	36	150	1	4	1
BOROUGH OF BROOKLYN	1,219,597	1,788	16.8	465	26.0	234	115	4	15	2
BOROUGH OF QUEENS	182,681	206	13.6	59	22.5	24	90	....	....	1
BOROUGH OF RICHMOND	72,608	101	17.0	16	16.0	24	40	....	2	....
Oyster Bay	16,334	1	......	0	......	1	......	....	....	....
Hempstead	27,066	35	15.8	13	37.1	5	57	....	....	....
North Hempstead	12,048	10	......	3	30.0	6	......	....	....	....
Southold	8,301	8	......	3	37.5	2	......	....	....	....
Sag Harbor	3,500	6	......	1	16.6	0	......	....	....	....
Huntington	9,483	17	......	4	23.5	2	......	....	....	....
Brookhaven	14,592	24	......	2	8.5	9	42	....	....	....
YONKERS	50,000	77	18.7	15	19.5	10	40	....	....	....
Greenburgh	15,564	3	......	0	......	0	......	....	....	....
MOUNT VERNON	20,346	23	13.2	1	43.5	8	......	....	....	....
Port Chester	7,440	15	......	5	33.3	1	65	....	....	....
Ossining	7,939	15	......	4	26.6	1	......	....	....	....
NEW ROCHELLE	14,720	10	......	3	30.0	1	......	....	....	....
Peekskill	10,358	29	......	4	14.0	4	70	1	1	....
White Plains	7,900	15	......	1	6.6	5	......	....	....	....
Rest of District	94,382	162	20.8	22	13.5	33	62	1	1	....
HUDSON VALLEY DIST. Totals	696,000	1,019	17.8	163	16.0	251	62	3	11	1
ALBANY	100,000	168	20.0	17	10.5	30	70	1	2	....
COHOES	24,000	30	15.6	9	30.0	4	35	....	....	....
TROY	75,057	141	22.8	23	14.5	25	43	....	1	....
WATERVLIET	14,321	25	......	3	12.0	4	40	....	....	....
Green Island	4,770	9	......	3	33.3	1	333	....	....	....
Hoosick Falls	5,671	11	......	2	18.2	2	......	....	....	....
RENSSELAER	7,466	16	......	2	12.5	0	62	....	1	....
Coxsackie	4,102	9	......	2	22.2	0	222	....	2	....
Catskill	5,486	5	......	3	60.0	0	......	....	....	....
HUDSON	9,528	14	......	3	21.4	3	70	....	....	....
KINGSTON	24,535	37	18.3	10	27.0	6	85	....	....	1
Ellenville	3,000	3	......	0	......	0	......	....	....	....
Marbletown	3,511	8	......	3	37.5	2	125	....	....	....
Rosendale	6,278	6	......	2	33.3	2	333	....	....	....
Esopus	4,907	3	......	1	33.3	1	......	....	....	....
Saugerties	3,700	5	......	0	......	1	......	....	....	....
POUGHKEEPSIE	24,029	40	20.8	2	5.0	14	100	....	2	....
Fishkill	13,016	27	......	6	22.2	5	37	....	....	....
Wappingers Falls	3,504	3	......	0	......	0	......	....	....	....
NEWBURGH	25,000	21	......	3	......	1	......	....	....	....
Port Jervis	9,385	12	......	1	8.3	3	83	....	....	....
MIDDLETOWN	14,522	13	......	2	15.2	3	......	....	....	....
Warwick	6,403	8	......	3	37.5	1	......	....	....	....
Goshen	4,564	6	......	0	......	1	......	....	....	....
Montgomery	5,939	7	......	2	28.5	0	......	....	....	....
Haverstraw	9,874	10	......	1	10.0	2	......	....	....	....
Nyack	4,275	2	......	1	......	......	......	....	....	....
Ramapo	7,502	15	......	2	13.3	5	......	....	....	....
Rest of District	271,800	365	16.8	57	15.6	135	63	2	3	....

DEPARTMENT OF HEALTH—VOLUME XIX

districts, cities, villages and towns during April, 1903

villages in *italic* and towns in Roman type.]

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
1	108	42	21	32	205	166	1,160	796	63	269	543	587	546	240	356	100	909
1	107	42	20	26	201	163	1,102	726	62	231	511	536	482	216	328	87	857
....	50	27	12	15	103	88	690	375	36	115	262	311	231	131	197	85	497
1	23	9	....	1	17	6	56	108	3	14	26	22	25	16	26	8	41
....	33	6	8	10	71	60	301	208	18	84	203	162	145	58	89	40	271
....	1	....	....	....	9	8	32	20	5	15	9	29	25	5	9	4	34
....	....	....	....	....	1	1	23	15	....	3	11	12	6	6	7	....	14
....	....	....	....	....	....	......	......	......	....	1	....	......	......	....	......	....	......
....	....	....	....	1	1	......	9	4	....	5	1	2	......	1	4	2	5
....	....	....	....	....	....	......	2	......	....	1	....	2	1	....	3	....	1
....	....	....	....	....	....	......	1	3	....	1	....	......	1	....	1	....	1
....	....	....	....	....	....	......	......	1	....	2	2	1	......	....	......	....	......
....	....	....	....	....	....	......	3	......	....	1	....	2	3	....	5	....	3
....	....	....	1	....	....	......	3	3	....	3	2	2	3	2	1	2	2
....	1	....	....	....	....	2	11	13	....	5	4	12	11	9	1	1	7
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	3
....	....	....	....	....	....	......	2	1	1	3	1	3	2	1	2	1	6
....	....	....	....	....	1	......	2	4	....	1	....	1	4	....	......	....	2
....	....	....	....	....	....	......	7	2	....	......	1	2	1	1	......	....	1
....	....	....	....	....	....	......	......	1	....	......	1	3	1	....	1	....	3
....	....	....	....	....	....	......	5	4	....	2	8	......	1	4	1	1	1
....	....	....	....	....	....	......	......	1	....	1	2	3	2	1	......	2	3
....	....	....	....	5	2	1	13	33	....	12	10	18	34	5	9	4	14
....	6	8	5	17	8	9	148	116	10	69	88	140	122	48	65	57	98
....	8	....	2	....	2	2	22	24	4	11	19	37	15	3	13	4	4
....	....	....	....	....	....	1	4	5	....	......	2	1	4	....	2	2	9
....	....	....	1	2	....	2	21	15	...	7	12	16	20	3	11	10	20
....	....	....	1	....	....	......	2	4	....	3	5	5	2	....	......	....	3
....	....	....	....	3	....	......	2	1	....	......	....	2	......	....	1	....	......
....	....	....	....	....	....	......	1	......	2	......	1	2	......	....	......	2	3
....	....	....	....	....	....	......	2	2	1	3	1	1	2	....	3	....	1
....	....	....	....	....	....	......	2	1	....	......	1	1	......	....	1	....	1
....	....	....	....	....	....	......	1	......	....	1	....	2	......	....	......	....	1
....	....	1	....	....	....	......	2	2	....	3	2	......	......	....	1	1	3
....	1	....	....	....	....	1	1	5	1	4	....	9	3	1	4	1	5
....	....	....	....	....	....	......	......	......	....	......	2	......	......	....	1	....	......
....	....	....	1	....	....	......	1	1	....	1	....	1	......	1	......	1	1
....	....	....	....	1	....	......	1	......	....	1	1	......	......	....	......	1	1
....	....	....	....	....	....	......	1	......	....	......	....	1	......	....	1	....	......
....	....	....	....	....	....	......	......	2	....	......	....	......	3	....	......	....	......
....	2	....	....	....	....	......	7	1	....	1	1	3	13	5	2	2	1
....	....	1	....	....	....	......	4	5	....	1	1	2	1	5	3	1	3
....	....	....	....	....	....	......	......	1	....	......	....	1	......	....	1	....	......
....	....	....	....	1	1	......	1	1	....	3	5	3	......	1	2	....	3
....	....	....	....	1	....	......	......	2	1	2	1	......	2	....	1	2	......
....	....	....	....	....	....	......	3	1	....	2	....	1	3	1	1	....	1
....	....	....	....	....	....	......	......	1	....	1	1	......	2	....	......	....	3
....	....	....	....	....	....	......	......	1	....	......	....	1	2	....	1	....	1
....	....	....	....	....	....	......	1	2	....	......	....	1	......	1	......	....	2
....	....	....	....	....	....	......	1	3	....	2	1	1	......	....	1	....	1
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	2
....	....	....	....	....	....	......	2	3	....	......	1	2	5	....	1	....	2
....	....	1	....	9	5	3	66	84	1	24	31	47	45	22	14	30	26

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
ADIRONDACK AND NORTHERN DISTRICT										
Totals	394,772	467	14.5	74	16.0	156	60	2	9	3
Watertown	21,700	24	13.5	4	16.6	9	83	....	....	....
Ellisburgh	3,888	5	......	1	20.0	4	......	....	....	....
Cape Vincent	2,882	......	......	......	......	......	......	....	....	....
Clayton	4,313	5	......	0	......	1	......	....	....	....
Ogdensburgh	12,633	13	12.0	2	......	3	......	....	1	....
Governeur	6,000	5	......	1	20.0	1	200	....	1	....
Potsdam	3,843	5	......	0	......	3	......	....	....	....
Canton	6,387	16	......	0	......	8	125	....	2	....
Malone	5,935	......	......	......	......	......	......	....	....	....
Plattsburgh	8,434	9	......	3	33.3	3	......	....	....	....
Glens Falls	12,613	18	17.5	3	16.6	4	166	2	....	1
Whitehall	4,377	4	......	0	......	0	......	....	....	....
Fort Edward	5,216	5	......	1	20.0	3	......	....	....	....
Sandy Hill	4,473	4	......	0	......	1	......	....	....	....
Granville	5,217	13	......	2	15.2	3	......	....	....	....
Greenwich	4,172	9	......	1	11.1	0	......	....	....	....
Lowville	3,746	11	......	0	......	4	90	....	....	1
Rest of District	279,000	321	14.0	56	17.5	109	53	...	5	1
MOHAWK VALLEY DIST.										
Totals	420,000	577	16.6	112	19.5	159	70	3	9	1
Schenectady	47,625	73	18.6	24	33.0	6	150	....	1	....
Cobleskill	3,973	10	......	1	10.0	3	......	....	....	....
Amsterdam	20,929	39	22.6	10	25.6	4	50	....	....	....
Fort Plain	2,444	3	......	0	......	2	......	....	....	....
Johnstown	10,130	12	......	1	8.4	5	......	....	....	....
Gloversville	18,349	27	18.0	5	18.5	6	......	....	....	....
Little Falls	10,381	4	......	0	......	2	......	....	....	....
Herkimer	5,555	4	......	3	75.0	0	......	....	....	....
Ilion	5,138	2	......	1	50.0	1	......	....	....	....
Utica	55,888	100	21.5	23	23.0	20	40	1	1	....
Whitestown	6,235	9	......	2	22.2	3	......	....	....	....
Rome	15,343	20	......	2	10.0	8	......	....	....	....
Boonville	3,382	1	......	0	......	0	......	....	....	....
Camden	3,745	3	......	1	33.3	0	......	....	....	....
Waterford	6,157	9	......	3	33.3	0	333	....	2	....
Mechanicville	4,695	9	......	3	33.3	0	......	....	....	....
Ballston Spa	3,923	3	......	0	......	3	......	....	....	....
Saratoga Springs	12,409	26	24.0	7	27.0	4	115	....	....	....
Rest of District	183,250	223	14.2	26	11.8	92	78	2	5	1
SOUTHERN TIER DISTRICT										
Totals	429,580	534	15.0	79	14.8	182	55	2	7	....
Binghamton	39,647	54	16.4	7	13.0	10	20	....	....	....
Owego	5,069	11	......	2	18.2	1	......	....	....	....
Candor	3,380	5	......	0	......	3	......	....	....	....
Waverly	4,465	8	......	1	12.5	2	250	....	1	....
Elmira	35,672	49	16.7	11	22.5	12	100	....	2	....
Horseheads	4,944	4	......	0	......	2	......	....	....	....
Hornellsville	12,000	19	19.0	4	21.0	4	52	....	....	....
Bath	5,000	1	......	0	......	0	......	....	....	....
Corning	11,061	16	17.5	3	18.7	5	63	....	....	....
Wellsville	5,000	8	......	0	......	0	......	....	....	....
Olean	9,462	7	......	1	14.3	1	285	1	1	....
Salamanca	4,251	3	......	1	33.3	1	......	....	....	....
Dunkirk	11,616	22	24.0	7	31.8	8	137	....	1	....

FOR APRIL—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Ersipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	2	....	4	1	5	2	61	50	9	34	31	70	47	11	22	47	57
....	....	....	....	....	1	1	1	1	1	2	2	9	3	....	....	....	3
....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	1	1	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	1	1	....	1	....	....	....	1	2
....	....	....	....	....	....	1	1	3	....	....	....	3	....	....	....	1	3
....	....	....	....	....	....	....	1	....	....	1	....	1	....	1	....	....	....
....	....	....	....	....	....	....	1	1	....	....	....	1	....	....	....	2	....
....	....	....	....	....	....	....	1	2	....	2	2	1	1	....	....	5	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	2	1	....	....	1	1	1	....	....	2	1
....	....	....	....	....	....	....	2	1	....	2	1	1	1	....	1	2	4
....	....	....	....	....	....	....	1	1	....	....	....	1	....	....	1	....	....
....	....	....	....	....	....	....	....	....	....	1	....	1	2	....	....	....	1
....	....	....	....	....	....	....	....	1	....	....	1	1	....	....	....	1	....
....	....	....	....	....	....	....	5	1	....	....	....	....	3	1	....	1	2
....	....	....	....	....	....	....	2	2	....	1	....	2	1	....	....	....	1
....	....	....	....	....	....	....	....	1	....	....	1	4	....	2	....	1	1
....	2	....	4	1	4	....	44	35	7	24	23	41	34	7	19	31	39
....	4	2	2	4	7	8	90	45	4	36	33	85	81	19	26	42	76
....	2	1	1	2	1	3	4	4	1	6	2	8	17	2	7	....	11
....	....	....	....	....	....	....	1	1	....	....	1	2	1	....	....	2	2
....	....	1	....	....	1	....	11	4	....	4	1	4	3	1	2	8	4
....	....	....	....	....	....	....	1	1	....	....	1	....	....	....	....	....	....
....	....	....	....	....	....	....	4	2	....	1	....	....	4	....	1	....	....
....	....	....	....	....	....	....	9	2	....	1	1	1	7	1	1	2	2
....	....	....	....	....	....	....	....	....	....	1	1	1	....	....	....	1	....
....	....	....	....	....	....	....	1	....	....	....	....	....	1	1	....	....	1
....	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....
....	2	....	....	....	....	....	15	10	1	5	6	15	17	4	2	4	17
....	....	....	....	....	....	....	3	....	....	....	1	1	....	2	....	....	2
....	....	....	....	....	....	....	....	1	1	2	1	5	2	....	....	4	4
....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....	....	1
....	....	....	....	....	....	1	1	....	....	....	2	1	1	....	....	....	1
....	....	....	....	....	....	....	3	....	....	....	2	....	1	1	1	....	1
....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	1	....
....	....	....	1	....	....	2	3	3	....	1	3	5	1	....	....	1	6
....	....	....	....	1	5	2	31	17	1	15	10	41	25	7	12	24	24
....	3	1	3	6	1	5	63	30	5	40	36	88	86	22	29	35	74
....	1	....	....	....	....	....	3	5	1	4	3	6	3	4	5	3	11
....	....	....	....	....	....	....	....	....	1	1	....	3	1	....	1	....	4
....	....	....	....	2	....	....	1	....	....	....	1	1	1	....	....	1	....
....	....	....	....	....	....	1	1	....	....	....	1	2	....	....	1	....	1
....	....	1	....	2	....	....	7	4	....	4	3	7	6	2	....	3	3
....	....	....	....	....	....	....	....	....	....	1	....	1	2	....	....	....	....
....	....	....	....	1	....	....	1	1	....	2	1	3	3	1	1	1	4
....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....
....	....	....	....	1	....	....	3	2	....	2	....	1	1	1	1	3	1
....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	[illegible]
....	....	....	....	....	....	....	1	1	....	1	....	....	....	....	1	....	[illegible]
....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	1
....	1	....	....	....	....	1	1	2	....	1	2	5	2	....	1	2	3

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths.	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
SOUTHERN TIER DISTRICT —(*Continued*)										
JAMESTOWN	22,892	24	13.0	6	25.0	6	40	....	....	....
Westfield	2,430	9	......	1	11.1	6	......	....	....	....
Fredonia	4,125	8	......	3	37.5	2	125	....	1	....
Rest of District	248,600	291	14.0	33	11.3	119	40	1	1	....
EAST CENTRAL DISTRICT Totals	403,000	484	14.5	77	15.8	147	65	1	3	1
SYRACUSE	108,374	136	15.2	30	22.0	24	75	1	....	....
Baldwinsville	3,000	3	......	1	33.3	1	333	....	....	....
DeWitt	5,435	3	......	1	33.3	0	......	....	....	....
Cortland	9,014	12	......	2	16.6	2	83	....	1	....
Homer	2,381	6	......	0	......	3	......	....	....	....
ONEIDA	7,942	13	......	1	7.7	5	77	....	....	....
Hamilton	3,744	7	......	2	28.5	2	......	....	....	....
Cazenovia	3,830	3	......	0	......	0	......	....	....	....
Canastota	3,300	6	......	2	33.3	1	......	....	....	....
Norwich	5,766	5	......	3	60.0	0	......	....	....	....
Oneonta	7,147	11	......	0	......	3	......	....	....	....
Worcester	2,409	3	......	0	......	3	......	....	....	....
Cooperstown	2,368	5	......	2	40.0	3	......	....	....	....
Walton	4,869	1	......	0	......	0	......	....	....	....
Delhi	3,243	6	......	1	......	3	......	....	....	....
Liberty	4,568	7	......	0	......	1	......	....	....	....
Rest of District	225,540	257	13.5	32	12.4	96	72	....	2	1
WEST CENTRAL DISTRICT Totals	320,600	460	17.3	48	10.5	164	40	1	4	....
AUBURN	35,000	69	24.0	9	13.0	17	60	1	....	....
ITHACA	13,136	17	......	2	11.8	4	353	....	4	....
Hector	4,187	4	......	0	......	3	......	....	....	....
Waterloo	4,256	7	......	0	......	3	......	....	....	....
Seneca Falls	6,519	9	......	0	......	2	......	....	....	....
GENEVA	10,433	14	......	2	14.2	0	......	....	....	....
Canandaigua	6,151	6	......	2	33.3	1	......	....	....	....
Manchester	4,733	5	......	0	......	1	......	....	....	....
Phelps	4,788	6	......	3	50.0	0	......	....	....	....
Penn Yan	4,650	2	......	0	......	0	......	....	....	....
Batavia	9,180	13	......	2	15.3	3	......	....	....	....
Dansville	3,633	......	......	......	......	......	......	....	....	....
Le Roy	3,144	5	......	0	......	1	......	....	....	....
Warsaw	4,341	7	......	1	14.2	0	......	....	....	....
Rest of District	206,500	296	17.0	27	10.0	129	30	....	....	....
LAKE ONTARIO AND WESTERN DISTRICT Totals	893,819	1,189	16.0	258	21.5	269	92	6	20	....
BUFFALO	370,000	498	16.5	130	26.0	75	110	2	13	....
TONAWANDA	7,421	12	......	3	25.0	3	......	....	....	....
Amherst	4,223	5	......	1	20.0	1	200	....	....	....
NORTH TONAWANDA	9,069	10	......	3	30.0	1	100	1	....	....
LOCKPORT	16,581	21	......	2	9.5	3	275	....	2	....
NIAGARA FALLS	19,457	33	18.8	15	48.5	2	125	....	1	....
Medina	4,716	9	......	0	......	3	......	....	....	....
Albion	4,477	8	......	0	......	1	......	....	....	....
Brockport	3,400	4	......	1	25.0	3	250	1	....	....
ROCHESTER	162,608	230	17.0	41	17.8	46	100	1	1	....
Palmyra	3,758	11	......	5	45.5	3	90	....	....	....

FOR APRIL—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATHS										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	1	....	....	....	2	1	....	2	....	12	3	1	1	4	7
....	....	....	....	....	....	....	....	....	....	1	1	1	4	....	1	....	1
....	....	....	....	....	....	....	3	....	....	....	....	3	1	....	....	....	....
....	1	....	2	2	1	3	39	14	3	21	22	51	54	13	15	17	31
....	2	5	3	11	8	3	68	36	8	31	36	88	68	29	21	29	43
....	....	1	1	4	2	1	18	11	1	6	12	23	17	10	4	6	18
....	....	....	....	1	....	....	....	1	....	....	....	....	1	....	....	....	....
....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	1
....	....	....	....	....	....	....	2	....	....	....	1	....	8	1	2	1	1
....	....	....	....	....	....	....	1	2	....	....	1	1	....	....	....	1	....
....	....	....	....	1	....	....	4	1	....	....	....	1	1	8	2	....	....
....	....	....	....	....	....	....	1	....	....	....	....	1	3	1	....	....	1
....	....	....	....	....	....	....	....	1	....	....	2	....	....	....	....	....	....
....	....	....	....	....	....	....	1	1	....	....	....	1	1	....	1	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	....	2
....	....	....	....	....	....	....	1	....	....	....	4	1	1	2	1	1	....
....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	1	....
....	....	....	....	....	....	....	1	....	....	1	1	1	1	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....
....	....	....	....	....	....	....	1	....	....	2	1	....	....	....	....	1	1
....	....	....	....	....	....	....	1	3	....	2	....	....	....	....	....	1	....
....	2	4	2	5	1	2	87	16	2	18	13	58	87	11	11	17	18
....	....	1	6	2	1	3	66	40	6	32	21	65	72	33	25	41	41
....	....	....	2	....	....	1	9	7	1	6	1	11	7	4	8	7	9
....	....	....	....	1	....	1	1	1	....	1	8	....	4	1	....	....	....
....	....	....	....	....	....	....	2	....	....	1	....	....	....	....	....	1	....
....	....	....	....	....	....	....	1	1	1	....	1	....	1	1	....	....	1
....	....	....	....	....	....	....	....	3	....	1	1	....	8	....	1	....	....
....	....	....	....	....	....	....	3	....	....	2	2	2	3	1	1	....	....
....	....	....	....	....	....	....	2	2	....	....	....	....	1	....	....	....	1
....	....	....	....	....	....	....	3	....	....	....	....	....	....	1	....	1	....
....	....	....	....	....	....	....	1	2	....	....	....	1	1	1	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
....	....	....	....	....	....	....	....	....	....	1	1	4	1	1	1	....	4
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	1	....	....	....	....	2	....	....	....	2
....	....	....	....	....	....	....	1	....	1	....	....	2	....	....	1	....	2
....	....	1	4	1	1	1	43	23	3	20	12	45	48	23	18	32	21
5	6	12	2	18	17	28	152	111	12	85	63	158	156	56	62	88	142
3	2	1	2	6	8	17	85	51	7	80	24	52	59	18	41	26	58
....	....	....	....	....	....	....	....	1	....	....	2	3	....	1	....	1	4
....	....	....	....	1	....	....	....	1	....	....	....	....	1	....	....	....	2
....	....	....	....	....	....	....	....	1	....	1	1	....	....	1	....	1	4
....	....	....	....	....	2	....	....	3	1	2	1	2	2	....	2	1	3
....	1	....	....	....	....	2	4	1	....	2	....	2	4	3	2	2	8
....	....	....	....	....	....	....	....	1	1	2	....	2	....	1	1	1	....
....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	2	....
2	....	6	....	2	6	6	17	27	2	17	10	35	37	11	8	12	30
....	....	1	....	....	....	....	....	1	....	1	....	1	2	1	....	....	4

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
LAKE ONTARIO AND WESTERN DIST.—(*Con.*)										
Newark	4,578	4	......	0	......	2	......	....	....	....
Lyons	5,824	3	......	0	......	2	......	....	....	....
Clyde	2,507	3	......	0	......	3	......	....	....	....
OSWEGO	22,200	23	13.0	3	13.0	2	87	....	....	....
FULTON	8,734	20	......	5	25.0	4	150	1	1	....
Richland	3,535	4	......	2	50.0	1	......	....	....	....
Rest of District	244,184	297	14.3	47	16.1	114	50	....	2	....
Totals for the State	7,910,600	10,951	17.0	2,685	24.5	2,104	84	49	105	10
Average for past 5 years	....	10,935	18.5	2,820	25.7	1,907	93	67	100	20

REMARKS—There was an average minimum temperature through the month of 56 degrees and an average minimum of 39, the highest temperatures, coming during the last days, being an average of 85 degrees everywhere except in Buffalo, where it reached only 72; lowest temperatures occurred on the 5th, of 23 degrees. The highest and lowest barometric pressures came in the first week. Daily range of temperature was very marked, from 35 to 50 degrees, on the 30th of the month, although generally through the month the diurnal ranges were not extreme. The mean temperatures of the entire month were 1 degree above the normal. From 8 to 15 sunshiny days were reported and an average of 11 cloudy, with more days on which rain fell in the Western than the Eastern part of the State, the total precipitation being excessive in the former and deficient in the latter. The wind movement was moderate, the average maximum velocity being 35 miles per hour, except on the seaboard and lakes.

AMENDMENTS TO THE PUBLIC HEALTH LAW—An act of the present Legislature, which became a law May 6 (chapter 383 of the Laws of 1903), makes certain amendments to the Public Health Law concerning which it is well that local boards of health should be informed.

Article I of this law, relating to the State Department of Health, has the following section added to it:

"*§ 13a. Approval of plans for certain works built by the State.—In all buildings and institutions, owned, maintained or controlled by the State, the plans for all water supply, sewerage, sewage-disposal, and garbage-disposal works shall be subject to the approval of the State Commissioner of Health before being adopted or constructed.*"

Article II, relating to local boards of health, has various amendments.

The first section of this article, which provides for the establishment and composition of the local board of health and the appointment of a health officer, is amended so as to provide that, in towns, the citizen member of the board shall be appointed *biennially*, and for a term of *two* years, instead of one as heretofore. The composition of the local boards of health is not otherwise changed, and the town board of health continues as heretofore to consist "of the town board and another citizen of full age," the latter to be appointed by the town board, but biennially instead of annually.

More important is an amendment as to the appointment of *health officers* for villages and towns, there being no change affecting the health officers of cities. The former provisions for appointment to this office by the local board of health are removed from the law, and the following now holds, being a part of this article:

"*The State Commissioner of Health shall appoint for each municipality except in the cities of the State, on the nomination of the local board of health, a competent physician, not a member of the local board of health, to be the health officer of the municipality. The term of office of the health officer shall be four years and he shall hold office till the appointment of his successor. He may be removed for just cause by the local board of health after a hearing; such approval* [*removal*] *must be approved by the State Commissioner of Health. The health officer need not reside within the municipality for which he shall be chosen, but unless he shall, he must reside in an adjoining town.*"

FOR APRIL—(*Concluded*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	......	......	1	....	......	....	1	......	1	......	1	......
....	....	....	....	....	....	......	1	......	....	......	....	......	2	....	......	....	......
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	1	2	......
....	....	1	....	....	1	......	1	2	....	1	2	7	1	....	2	....	5
....	....	....	....	1	....	......	8	8	....	1	1	1	8	1	2	....	2
....	....	....	....	....	....	......	1	......	....	......	....	......	......	....	......	1	2
....	8	3	....	8	....	8	40	18	1	28	22	51	44	17	8	84	25
6	181	66	46	86	247	224	1,808	1,224	112	596	851	1,279	1,178	453	606	484	1,440
21	123	123	54	92	258	165	2,068	1,208	104	708	840	1,042	1,241	390	466	490	1,360

The second section of this article, relating to the general powers and duties of local boards of health, has an amendment affecting the compensation of health officers, which they are directed to fix, following which provision in the law is now added this amendment:

"*In addition to his compensation so fixed, the board of health may allow the reasonable expenses of said health officer in going to, attending and returning from, the annual sanitary conference of health officers, or equivalent meeting, held yearly within the State, and may also in its judgment, whenever the services rendered by its health officer during any year are extraordinary, or extra hazardous, by reason of epidemic, or otherwise, allow to him such further sum in addition to said fixed compensation as shall be audited by the town board of a town or by the board of trustees of a village, which said expenses and said additional compensation shall be a charge upon and paid by the municipality as provided in section thirty of this act.*"

For the abatement of nuisances (same section) by serving notices upon owners of premises on which such nuisances exist, is added, "or upon which may exist the causes of other nuisances to other premises, or cause the same to be conspicuously posted thereon;" which will reach conditions occasionally attended with difficulty. Related phrases are added to sections 25 and 26 on nuisances and their removal.

Where the recommendations of the board of health of a village regarding additions to sewers are approved by the village trustees and the State Department of Health, it is the duty of the trustees, "*whether sufficient funds shall be on hand for such purpose or not,*" to forthwith make such additions, the expenses to be paid "in the same manner as other village expenses are paid *or in the same manner that other sewers may be paid for in that village.*" (Amendments in italics.)

There is likewise added to section 26, on Removal of Nuisances, the following paragraph:

"*Whenever the suppression or removal of such nuisance or conditions detrimental to health demand the immediate expenditure of money, every such local board of health shall be authorised to use for such purpose any money in the hands of the board, or may call on the city council, village trustees or town board for such money or it may borrow the same on the credit of the municipality. All such moneys so expended or borrowed shall be immediately repaid to the fund or source whence they were received on the recovery of the same by action or otherwise from the persons responsible for the expenses of suppression or removal.*"

Of minor importance is the amendment of the law by substituting for the term State Board of Health, that of State Department of Health, in accordance with the present facts and terminology.

THE APRIL MORTALITY is that of the average for five years past. *Grippe* perhaps caused 1200 deaths: the *reported* deaths were 40 in New York city and 166 in the rest of the State. The mortality of early life is below the average, of old age it is excessive. Acute respiratory diseases have decreased from March. *Pneumonia* and *Bright's disease* respectively caused 1067 and 692 deaths. *Smallpox* caused 3 deaths in Buffalo, 2 in Rochester and 1 in New York; cases still prevail in Delaware, Chautauqua and Clinton counties; at Saranac, St. Regis Falls and Malone, a few; Elmira, 2 imported cases, and at Mechanicville several recently discovered.

MONTHLY BULLETIN OF THE NEW YORK STATE

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro spinal meningitis	Typhoid fever	Malarial diseases
MARITIME DISTRICT Totals	4,052,875	6,227	18.0	1,819	29.2	633	118	37	47	16
CITY OF NEW YORK Totals	3,732,903	5,847	18.5	1,756	30.0	559	122	35	46	14
BOROUGH OF MANHATTAN	1,917,676	3,291	20.2	1,086	33.0	278	126	27	22	7
BOROUGH OF THE BRONX	268,341	387	17.0	75	19.3	40	122	1	1	3
BOROUGH OF BROOKLYN	1,219,598	1,863	17.0	535	28.8	212	122	7	19	3
BOROUGH OF QUEENS	182,681	224	14.3	51	22.8	17	98	....	2	....
BOROUGH OF RICHMOND	72,608	82	13.3	9	11.2	12	75	...	2	1
Oyster Bay	16,334	24	....	4	16.6	6	....	....	....	....
Hempstead	27,066	23	10.5	3	13.0	5	130	....	....	1
North Hempstead	12,048	12	....	3	25.0	1	83	....	....	....
Southold	8,301	3	....	1	33.3	0	....	....	....	....
Sag Harbor	3,500	5	....	3	60.0	0	200	....	....	....
Huntington	9,483	10	....	1	10.0	1	....	....	....	....
Brookhaven	14,592	15	....	2	13.3	5	63	....	....	....
YONKERS	50,000	56	13.2	12	21.4	6	107	1	....	....
Greenburgh	15,564	13	....	3	23.0	1	77	....	1	....
MOUNT VERNON	20,346	22	13.0	4	18.2	8	....	....	....	....
Port Chester	7,440	....	....	....	....	....	....	....	....	....
Ossining	7,939	14	....	1	7.0	2	....	....	....	....
NEW ROCHELLE	14,720	17	....	4	23.5	2	118	1	....	....
Peekskill	10,358	10	....	4	....	2	....	....	....	....
White Plains	7,900	11	....	3	27.3	3	180	....	....	....
Rest of District	94,382	145	17.4	15	10.6	32	15	....	....	1
HUDSON VALLEY DIST. Totals	696,000	1,021	17.3	155	15.0	268	77	11	10	4
ALBANY	100,000	151	17.8	21	14.0	29	90	....	....	....
COHOES	24,000	36	17.6	14	39.0	4	156	1	1	....
TROY	75,057	132	20.7	27	20.4	19	53	2	1	....
WATERVLIET	14,321	21	....	2	9.6	4	96	....	2	....
Green Island	4,770	7	....	1	14.2	2	....	....	....	....
Hoosick Falls	5,671	7	....	2	28.5	2	....	....	....	....
RENSSELAER	7,466	9	....	2	....	4	....	....	....	....
Coxsackie	4,102	9	....	3	33.3	2	....	1	....	....
Catskill	5,486	7	....	0	....	2	....	....	....	....
HUDSON	9,528	9	....	2	22.2	3	222	....	....	1
KINGSTON	24,535	47	22.5	7	....	6	....	....	....	....
Ellenville	3,000	2	....	0	....	1	....	....	....	....
Marbletown	3,511	3	....	0	....	0	333	1	....	....
Rosendale	6,278	10	....	1	10.0	2	100	....	....	1
Esopus	4,907	7	....	5	....	1	....	....	....	....
Saugerties	3,700	3	....	1	....	1	....	....	....	....
POUGHKEEPSIE	24,029	24	12.5	9	37.5	9	83	....	....	....
Fishkill	13,016	20	....	2	10.0	4	50	....	1	....
Wappingers Falls	3,504	8	....	0	....	2	125	....	1	....
NEWBURGH	25,000	33	15.5	10	30.0	5	120	1	....	....
Port Jervis	9,385	10	....	1	10.0	4	....	....	....	....
MIDDLETOWN	14,522	21	....	0	....	3	95	....	....	....
Warwick	6,403	7	....	3	42.8	1	....	....	....	....
Goshen	4,564	9	....	0	....	3	....	....	....	....
Montgomery	5,939	6	....	0	....	1	....	....	....	....
Haverstraw	9,874	9	....	1	11.1	2	222	....	....	1
Nyack	4,275	7	....	1	33.3	1	....	....	....	....
Ramapo	7,502	12	....	3	25.0	4	....	....	....	....
Rest of District	271,800	395	17.4	37	9.5	127	70	5	4	1

DEPARTMENT OF HEALTH—VOLUME XIX

districts, cities, villages and towns during May, 1903

villages in *italic* and towns in Roman type.]

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	90	71	26	33	228	188	1,143	734	67	276	537	562	572	221	401	65	913
....	87	70	26	31	221	185	1,088	688	65	264	504	516	518	204	378	56	866
....	40	38	19	23	118	120	659	343	38	119	271	291	286	121	217	21	511
....	17	1	2	1	14	7	51	111	1	10	34	24	15	6	31	10	46
....	25	28	3	7	84	50	329	206	22	118	181	179	183	68	96	21	243
....	5	3	1	....	4	7	29	16	4	9	14	13	24	9	21	1	62
....	....	....	1	....	1	1	20	12	....	8	4	9	10	4	7	3	4
....	....	....	....	....	....	....	6	1	1	3	2	1	5	....	2	....	3
....	....	....	....	....	2	....	4	3	....	1	2	2	5	....	....	....	3
....	1	....	....	....	....	....	1	1	....	1	....	1	5	....	2	....	....
....	....	....	....	....	....	....	1	....	....	....	2	....	....	....	....	....	....
....	....	....	....	1	....	....	1	1	....	....	....	1	....	....	....	....	1
....	....	....	....	....	....	....	2	2	....	....	2	....	1	....	....	1	2
....	....	....	....	....	1	....	1	2	....	1	....	2	2	2	1	1	2
....	....	....	....	....	4	1	9	6	1	2	2	8	7	2	7	....	6
....	....	....	....	....	....	....	3	1	....	1	1	1	1	....	2	1	1
....	....	....	....	....	....	....	5	2	....	1	1	7	1	1	2	....	2
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	4	3	....	1	1	....	2	....	2	1	....
....	....	1	....	....	....	....	4	2	....	3	1	....	1	....	2	....	2
....	....	....	....	....	....	....	2	1	....	1	....	2	....	....	1	....	4
....	1	....	....	1	....	....	....	....	....	....	1	....	1	....	1	2	3
....	1	....	....	....	....	2	12	21	....	7	18	21	23	12	6	3	18
....	19	2	3	12	10	9	158	118	6	65	79	159	125	42	53	47	100
....	7	....	2	2	3	....	80	22	....	5	16	31	6	7	5	6	9
....	2	....	....	1	....	1	2	2	....	2	3	2	9	3	1	1	5
....	1	....	....	1	1	1	28	14	2	6	7	19	15	4	7	7	16
....	....	....	....	....	....	....	1	1	....	1	4	2	5	2	1	1	1
....	....	....	....	....	....	....	....	....	....	1	1	1	1	1	1	....	1
....	....	....	....	....	....	....	....	1	....	....	....	2	2	....	....	....	2
....	....	....	....	....	....	1	2	1	....	....	....	3	1	....	1	....	....
....	....	....	....	....	....	....	8	....	....	....	1	2	....	1	....	....	1
....	....	....	....	....	....	....	....	2	....	....	1	2	1	....	....	1	....
....	....	1	....	....	....	....	1	1	....	....	....	....	1	1	....	....	3
....	3	....	1	1	....	....	7	2	....	7	1	3	6	3	2	....	6
....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....
....	....	....	....	....	....	....	3	....	....	2	....	1	1	....	1	....	2
....	....	....	....	1	....	....	8	....	....	1	....	....	....	....	1	....	1
....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	....	....	....
....	....	....	....	1	....	1	3	1	....	2	2	5	3	1	1	1	3
....	....	....	....	....	....	....	2	2	....	2	3	2	6	....	3	....	2
....	....	....	....	....	....	....	1	2	....	....	....	1	....	1	....	1	1
....	....	....	....	....	....	3	1	6	2	4	1	5	1	1	2	1	3
....	....	....	....	....	....	....	....	1	....	....	2	1	3	....	....	1	2
....	....	....	....	....	1	1	2	3	1	1	1	2	4	1	2	2	....
....	....	....	....	....	....	....	1	1	....	1	2	....	....	....	1	....	2
....	....	....	....	....	....	....	2	1	....	2	1	....	1	....	1	1	....
....	....	....	....	....	....	....	1	2	....	....	1	....	1	....	1	....	....
....	....	....	....	....	....	1	2	1	....	....	....	....	2	....	....	....	2
....	....	....	....	....	....	....	1	2	....	....	1	....	1	....	....	....	2
....	....	....	....	....	....	....	1	8	....	....	....	2	3	1	....	....	2
....	6	1	....	5	5	....	55	42	....	23	31	66	53	15	23	24	33

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
ADIRONDACK AND NORTHERN DISTRICT										
Totals	394,778	409	12.0	74	18.0	122	62	1	7	....
WATERTOWN	21,700	35	19.0	6	17.1	4	143	....	3	....
Ellisburg	3,868	6	......	1	16.6	1	......	....	....	....
Cape Vincent	2,882	3	......	0	......	1	333	....	....	....
Clayton	4,813	9	......	0	......	1	......	....	....	....
OGDENSBURG	12,633	13	14.0	2	15.4	3	75	....	1	....
Gouverneur	6,000	7	......	2	28.5	3	142	....	....	....
Potsdam	3,843	4	......	0	......	2	......	....	....	....
Canton	6,337	6	......	1	16.6	1	......	....	....	....
Malone	5,935	4	......	2	50.0	0	......	....	....	....
Plattsburg	8,434	10	......	4	40.0	1	100	....	....	....
Glens Falls	13,613	5	......	1	......	1	......	....	....	....
Whitehall	4,377	6	......	1	16.6	4	......	....	....	....
Fort Edward	5,216	6	......	3	50.0	1	......	....	....	....
Sandy Hill	4,473	3	......	0	......	2	......	....	....	....
Granville	5,217	9	......	1	11.1	3	111	....	....	....
Greenwich	4,172	5	......	2	40.0	1	......	....	....	....
Lowville	3,746	6	......	1	......	2	......	....	....	....
Rest of District	279,000	272	11.0	45	17.2	86	60	1	3	....
MOHAWK VALLEY DIST.										
Totals	420,000	593	16.0	103	18.0	164	100	3	3	....
SCHENECTADY	47,625	79	19.5	25	31.6	13	230	1	3	....
Cobleskill	3,973	5	......	1	20.0	3	200	....	....	....
AMSTERDAM	20,929	37	20.7	13	35.0	6	216	....	1	....
Fort Plain	2,444	3	......	0	......	1	......	....	....	....
JOHNSTOWN	10,130	11	......	0	......	2	......	....	....	....
GLOVERSVILLE	18,849	36	24.0	6	16.6	6	55	1	....	....
LITTLE FALLS	10,881	3	......	1	33.3	0	......	....	....	....
Herkimer	5,555	2	......	1	......	0	......	....	....	....
Ilion	5,138	3	......	0	......	0	......	....	....	....
UTICA	56,383	70	14.5	13	18.5	16	428	....	....	....
Whitestown	6,235	9	......	1	......	2	......	....	....	....
ROME	15,343	21	16.0	3	14.2	5	100	....	....	....
Boonville	3,332	2	......	0	......	1	......	....	....	....
Camden	3,745	10	......	1	......	5	......	....	....	....
Waterford	6,157	4	......	0	......	0	......	....	....	....
Mechanicville	4,605	9	......	1	11.1	0	......	....	....	....
Ballston Spa	3,923	4	......	0	......	1	......	....	....	....
Saratoga Springs	12,409	20	......	6	30.0	3	200	....	1	....
Rest of District	183,250	260	15.0	33	12.5	106	85	1	3	....
SOUTHERN TIER DISTRICT										
Totals	429,530	478	13.0	60	12.8	141	55	1	2	3
BINGHAMTON	39,647	44	13.0	7	16.0	6	90	....	....	1
Owego	5,039	3	......	1	......	1	......	....	....	....
Candor	3,330	2	......	0	......	1	......	....	....	....
Waverly	4,465	3	......	1	33.3	0	......	....	....	....
ELMIRA	35,672	52	17.1	4	7.7	14	120	....	2	1
Horseheads	4.944	1	......	0	......	1	......	....	....	....
HORNELLSVILLE	12,000	13	......	2	15.2	3	......	....	....	....
Bath	5,000	3	......	0	......	4	......	....	....	....
CORNING	11,061	13	......	3	23.0	2	......	....	....	....
Wellsville	5,000	4	......	0	......	3	......	....	....	....
OLEAN	9,462	5	......	0	......	0	......	....	....	....
Salamanca	4,251	8	......	2	25.0	0	......	....	....	....
DUNKIRK	11,616	22	......	4	18.2	3	90	....	....	....

FOR MAY—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	2	1	3	3	5	3	45	49	6	24	27	56	49	19	26	26	57
....	....	....	....	....	2	......	7	3	1	......	2	4	3	1	1	2	6
....	....	....	....	....	....	......	1	......	....	......	1	......	1	1	......	....	2
....	....	....	....	....	1	......	......	......	....	......	....	2	......	....	......	....	......
....	....	....	....	....	....	......	1	1	....	......	2	1	2	1	......	1	......
....	....	....	....	....	....	......	2	......	....	1	2	2	......	1	1	2	1
....	....	....	....	....	....	1	......	2	....	......	....	2	1	....	......	....	1
....	....	....	....	....	....	......	......	1	....	......	....	1	......	....	......	1	1
....	....	....	....	....	....	......	......	2	1	......	....	......	1	....	......	1	1
....	....	....	....	....	....	......	......	1	....	......	....	1	......	....	1	....	1
....	....	....	....	....	....	1	2	2	1	......	....	......	2	....	......	1	1
....	....	....	....	....	....	......	......	......	....	1	....	......	......	1	......	1	2
....	....	....	....	....	....	......	2	......	....	......	1	......	......	1	1	....	1
....	....	....	....	....	....	......	......	......	....	......	....	......	1	....	1	....	4
....	....	....	....	....	....	......	......	1	....	1	....	......	1	....	......	....	......
....	....	....	....	....	1	......	4	1	....	......	1	1	......	....	1	....	......
....	....	....	....	....	....	......	......	1	....	......	....	1	1	....	......	....	2
....	....	....	....	....	....	......	......	......	....	3	....	1	1	....	......	1	......
....	2	1	3	3	1	1	26	34	3	18	18	40	35	13	20	16	34
....	10	4	5	15	3	10	71	54	7	36	47	77	64	29	40	47	63
....	4	3	....	2	1	4	12	5	2	3	6	5	8	1	8	4	7
....	....	....	....	1	....	......	1	......	....	......	....	......	......	1	......	2	......
....	2	....	....	2	2	1	2	2	1	1	2	4	2	5	3	2	5
....	....	....	....	....	....	......	......	1	....	......	....	1	1	....	......	....	......
....	....	....	....	....	....	......	1	4	....	2	....	......	......	2	1	1	......
....	....	....	....	1	....	......	2	4	....	1	2	6	2	5	2	1	9
....	....	....	....	....	....	......	......	1	....	1	....	......	1	....	......	....	......
....	....	....	....	....	....	......	......	......	....	......	1	......	......	....	1	....	......
....	....	....	....	....	....	......	1	3	....	......	....	2	1	1	......	....	......
....	1	....	....	1	....	1	9	8	....	5	3	9	12	2	7	2	10
....	....	....	....	....	....	......	4	......	....	......	....	2	1	....	1	1	......
....	....	....	....	1	....	1	2	3	....	2	2	3	2	....	3	....	2
....	....	....	....	....	....	......	......	......	....	1	....	......	1	....	......	....	......
....	....	....	....	....	....	......	1	......	....	1	1	3	......	....	......	2	2
....	....	....	....	....	....	......	......	1	....	1	....	......	1	1	......	....	......
....	....	....	....	....	....	......	1	1	....	1	2	1	......	....	3	....	......
....	....	....	....	....	....	......	2	......	....	......	....	1	......	....	......	....	1
....	....	....	1	1	....	1	3	3	....	1	2	4	1	1	......	....	1
....	3	1	4	6	....	2	30	18	4	16	26	36	31	10	11	32	26
....	1	3	1	7	5	3	56	32	4	37	33	75	61	26	32	36	50
....	....	....	....	....	2	1	3	4	....	6	3	4	7	3	3	2	5
....	....	....	....	1	....	......	1	1	....	......	....	......	......	....	......	....	......
....	....	....	....	....	....	......	......	......	....	......	....	1	......	1	......	....	......
....	....	....	....	....	....	......	......	1	....	......	....	1	......	....	......	....	1
....	....	1	....	1	....	1	5	2	....	3	7	11	7	2	1	5	3
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	1	......
....	....	....	....	....	....	......	3	2	1	1	....	1	3	....	1	....	1
....	....	....	....	....	....	......	......	2	....	......	....	2	2	....	1	....	1
....	....	....	....	....	....	......	1	1	1	2	2	2	2	1	......	....	1
....	....	....	....	....	....	......	......	......	....	......	1	1	......	....	......	1	1
....	1	....	....	....	....	......	1	......	....	......	....	3	......	....	......	....	......
....	....	....	....	....	....	......	3	......	....	......	....	1	......	1	1	....	2
....	....	....	....	1	1	......	4	3	....	3	1	1	2	1	3	....	2

MONTHLY BULLETIN

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
SOUTHERN TIER DISTRICT —(*Continued*)										
JAMESTOWN	22,892	26	14.0	3	11.5	5	....	....	....	....
Westfield	2,430	1	....	1	....	0	....	....	....	....
Fredonia	4,125	5	....	1	20.0	1	200	1	....	....
Rest of District	248,600	263	12.5	31	12.0	97	42	....	....	1
EAST CENTRAL DISTRICT Totals	403,000	533	15.2	70	13.2	169	46	....	4	....
SYRACUSE	108,374	156	17.2	28	18.0	29	61	....	1	....
Baldwinsville	3,000	4	....	0	....	2	....	....	....	....
DeWitt	5,435	8	....	0	....	4	....	....	....	....
Cortland	9,014	19	....	3	15.8	8	170	....	1	....
Homer	2,381	6	....	0	....	2	166	....	1	....
ONEIDA	7,942	12	....	0	....	3	....	....	....	....
Hamilton	3,744	5	....	1	20.0	2	....	....	....	....
Cazenovia	3,830	9	....	1	11.1	4	....	....	....	....
Canastota	3,300	3	....	1	33.3	1	....	....	....	....
Norwich	5,766	7	....	2	28.5	2	142	....	....	....
Oneonta	7,147	12	....	1	8.4	6	....	....	....	....
Worcester	2,409	9	....	4	44.4	1	....	....	....	....
Cooperstown	2,368	1	....	0	....	1	....	....	....	....
Walton	4,869	8	....	0	....	5	....	....	....	....
Delhi	3,248	1	....	0	....	0	....	....	....	....
Liberty	4,568	11	....	1	9.0	3	....	....	....	....
Rest of District	225,540	262	13.4	28	11.0	96	31	....	1	....
WEST CENTRAL DISTRICT Totals	330,600	370	13.5	25	7.0	148	41	....	4	2
AUBURN	35,000	29	10.0	3	10.3	6	100	....	1	....
ITHACA	13,136	14	....	1	7.0	8	70	....	1	....
Hector	4,137	1	....	1	....	0	....	....	....	....
Waterloo	4,256	5	....	0	....	1	....	....	....	....
Seneca Falls	6,519	5	....	0	....	2	....	....	....	....
GENEVA	10,433	19	....	2	10.5	5	50	....	....	....
Canandaigua	6,151	12	....	0	....	4	....	....	....	....
Manchester	4,733	6	....	0	....	2	....	....	....	....
Phelps	4,788	7	....	1	14.2	3	142	....	....	....
Penn Yan	4,650	9	....	2	22.2	5	....	....	....	....
Batavia	9,180	7	....	1	14.2	1	142	....	1	....
Dansville	3,633	7	....	0	....	3	....	....	....	....
Le Roy	3,144	2	....	0	....	0	....	....	....	....
Warsaw	4,841	4	....	1	25.0	2	....	....	....	....
Rest of District	206,500	243	14.0	13	5.4	106	33	....	1	2
LAKE ONTARIO AND WESTERN DISTRICT Totals	893,819	1,144	15.0	217	19.1	273	91	5	17	....
BUFFALO	370,000	497	16.0	109	22.0	83	114	4	8	....
TONAWANDA	7,421	5	....	1	....	1	....	....	....	....
Amherst	4,223	3	....	0	....	1	....	....	....	....
NORTH TONAWANDA	9,069	13	....	5	39.0	0	....	....	....	....
LOCKPORT	16,581	22	15.0	5	22.0	6	90	....	1	....
NIAGARA FALLS	19,457	24	14.5	11	45.7	4	85	....	....	....
Medina	4,716	8	....	1	12.5	1	....	....	....	....
Albion	4,477	5	....	2	40.0	2	200	....	....	....
Brockport	3,400	4	....	0	....	2	....	....	....	....
ROCHESTER	163,608	207	15.0	29	14.0	43	115	1	....	....
Palmyra	3,758	4	....	0	....	0	....	....	....	....

FOR MAY—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	......	3	1	....	2	4	7	1	1	1	6	4
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	1
....	....	....	....	....	....	......	1	......	....	......	....	1	......	....	......	1	1
....	....	2	1	4	2	1	32	15	2	20	20	39	37	16	21	23	27
....	....	10	....	4	8	4	78	37	5	33	43	79	33	36	24	40	50
....	....	6	....	2	2	......	21	6	2	10	15	29	18	10	9	4	21
....	....	....	....	....	....	......	1	......	1	......	1	1	......	....	......	....	......
....	....	....	....	....	....	......	1	1	....	1	1	......	1	....	1	2	......
....	....	1	....	....	....	1	4	......	....	......	2	1	4	2	1	2	......
....	....	....	....	....	....	......	......	......	....	1	....	1	1	....	......	2	......
....	....	....	....	....	....	......	2	1	....	2	1	2	1	2	......	....	1
....	....	....	....	....	....	......	3	......	....	......	....	1	1	....	......	....	......
....	....	....	....	....	....	......	2	......	....	1	....	3	......	1	1	2	......
....	....	....	....	....	....	1	1	1	....	......	....	......	......	....	......	....	......
....	....	....	....	....	1	......	2	......	....	......	1	......	......	2	......	....	1
....	....	....	....	....	....	......	......	......	....	2	1	1	2	1	......	8	1
....	....	....	....	....	....	......	1	......	....	......	....	1	2	....	......	....	5
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	1
....	....	....	....	....	....	......	1	......	....	......	....	1	4	2	......	....	......
....	....	....	....	....	....	......	1	......	....	......	....	......	......	....	......	....	......
....	....	....	....	....	....	......	2	7	....	1	....	......	......	1	......	....	......
....	....	8	....	2	....	2	86	21	2	15	21	39	49	15	12	25	19
....	....	8	2	1	3	......	34	81	1	27	30	62	59	19	24	81	37
....	....	1	....	....	1	......	4	5	....	1	3	4	2	1	2	1	1
....	....	....	....	....	....	......	......	.....	....	2	1	3	2	1	1	1	2
....	....	....	....	....	....	......	......	......	....	......	1	......	......	....	......	....	......
....	....	....	....	....	....	......	2	1	....	......	....	1	......	1	......	....	......
....	....	....	....	....	....	......	1	......	1	......	....	2	......	....	......	1	......
....	....	....	1	....	....	......	3	2	....	......	1	3	2	2	......	....	5
....	....	....	....	....	....	......	......	......	....	2	3	3	1	....	1	2	......
....	....	....	....	....	....	......	1	3	....	......	....	......	......	....	1	1	......
....	....	....	....	....	....	......	2	......	....	2	....	1	......	....	......	1	......
....	....	....	....	....	....	......	1	......	....	......	....	2	1	2	......	1	2
....	....	....	....	....	....	......	1	......	....	1	....	1	......	....	1	....	2
....	....	....	....	....	....	......	......	......	....	......	....	1	3	....	......	2	1
....	....	....	....	....	....	......	......	......	....	......	....	1	......	....	......	....	1
....	....	....	....	....	....	......	1	......	....	......	....	1	......	....	1	....	1
....	....	2	1	1	1	......	18	20	....	19	21	39	48	12	18	21	19
3	5	14	6	10	18	32	143	39	11	92	73	158	172	37	85	68	106
....	2	5	5	4	6	22	74	39	5	31	39	52	75	14	41	24	47
....	....	....	....	....	....	......	1	......	....	2	....	......	......	....	......	1	1
....	....	....	....	....	....	......	......	......	....	1	....	......	1	....	......	1	......
....	....	....	....	....	....	......	3	1	....	3	...	1	1	....	3	....	1
....	....	....	....	....	1	2	1	1	....	3	1	2	1	1	1	4	3
....	....	....	....	....	....	2	1	1	1	2	2	4	2	....	2	1	6
....	....	....	....	....	....	......	2	2	.. .	1	....	2	1	....	......	....	......
....	....	....	....	....	....	1	......	1	....	1	....	1	......	....	......	....	1
....	....	....	....	....	....	......	......	......	....	......	1	2	......	....	1	....	......
3	1	5	1	....	10	3	18	25	2	18	15	34	34	10	9	8	10
....	....	....	....	....	....	......	......	......	....	1	....	2	......	....	1	....	......

Monthly Bulletin

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
LAKE ONTARIO AND WESTERN DIST.—(*Con.*)										
Newark	4,578	9	......	0	......	4	......	....	....	....
Lyons	5,824	9	......	1	11.1	8	......	....	....	....
Clyde	2,507	8	......	0	......	1	......	....	....	....
OSWEGO	22,200	27	14.8	7	26.0	9	110	....	....	....
FULTON	8,734	14	......	4	28.5	5	71	....	....	....
Richland	8,535	6	......	0	......	2	......	....	....	....
Rest of District	244,184	284	14.0	42	14.5	106	65	....	8	....
Totals for the State	7,910,000	10,770	16.1	2,523	23.5	1,912	100	58	99	25
Average for past 5 years	....	10,240	16.8	2,721	26.5	1,793	96	58	95	21

Remarks—The chief characteristic of the weather of May was the excessive drought, especially in the East, the average rainfall for most of the State being 0.33 of an inch against a normal of 2.67. This deficiency, in the East, is continuous from April. The temperature was likewise everywhere above the normal for the month, in contrast with last May which was dry and cold. The weather was more equable, the mean highest temperature being 70 degrees, lowest 51 degrees, with but one to three days a minimum frost temperature. There were an unusual number of clear, sunshiny days, and the wind movement was moderate, the maximum velocity being 42 miles per hour, on the first. The third week was the warmest and the month ends with a maximum temperature of 63 degrees.

Dysentery Investigation—This Department last summer investigated an epidemic of dysentery in the vicinity of Yonkers and Mount Vernon, and much valuable scientific information was obtained thereby. This summer the Antitoxin Laboratory will coöperate with the Rockefeller Institute in a more careful study of the cause and especially the treatment of this disease.

Health officers who have epidemics of this disease developing within their jurisdiction during the summer will confer a favor upon the Department and possibly greatly benefit the patients by immediately notifying the State Commissioner of Health, at Albany, of the existence of the disease, in order that a scientific investigation of it may be made. It would be well to make an immediate report so that the investigation can be made promptly.

The term "dysentery" is considered to include that class of epidemic diarrhœal troubles in which mucus and blood constitute the abnormal elements in the fæcal discharges. It is not the intention to undertake, at this time, the general investigation of the simple summer diarrhœas of children occurring in all parts of the State, but to limit the scope of the work, outside of Albany, to those epidemics which include adults as well as children as patients.

Fourth of July Tetanus—As the annual increase in the number of cases of tetanus due to Fourth of July gunshot injuries may soon be expected, the attention of the local health officers is again called to the fact that this Department is prepared to furnish tetanus antitoxin under the usual conditions. It is distributed in vials of two sizes. One holding 10 c.c. is intended for the immunising of persons who have been injured in such a manner as to include dirt, powder, gun wads and other tetanus germ-bearing material in the injured tissues. The other vial contains 50 c.c., or one therapeutic dose for subcutaneous injection.

The prophylactic use of tetanus antitoxin is most strongly advised in all cases of Fourth of July injury. Experience has shown that the subcutaneous injection of from 10 to 20 c.c. of tetanus antitoxin at the first dressing of such an injury is a practically sure means of preventing the onset of the disease. If a case of the disease develops, begin the administration of the available tetanus antitoxin and telegraph to the Department for a further supply. The serum may be administered

FOR MAY—(*Concluded*)

Zymotic Diseases							Other Causes of Death										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	......	1	......	....	......	1	3	......	1	2	1	....
....	....	....	....	....	....	......	2	......	....	......	1	2	8	....	1	....	....
....	....	....	....	....	....	......	1	......	....	......	....	......	......	....	1	....	1
....	....	1	.. .	1	1	......	5	1	....	......	1	3	4	2	3	2	3
....	....	....	....	1	....	......	3	1	....	......	1	3	2	....	1	1	1
....	....	....	....	....	....	......	1	......	....	......	....	......	1	1	......	1	2
....	2	3	....	4	....	2	80	17	3	29	11	47	47	8	19	24	30
3	127	108	46	85	275	249	1,722	1,139	107	590	874	1,228	1,185	429	685	360	1,876
25	182	112	41	82	244	180	1,590	1,188	90	686	794	1,021	1,157	412	568	450	1,294

in the several ways described in the directions with each bottle. The spinal subdural injection, by means of a lumbar puncture, of from 10 to 50 c.c. of antitoxin has recently given excellent results, and is apparently an entirely safe procedure even with the larger dose mentioned. The production of sleep and the cessation of the spasms, although temporary in character, were of longer duration than have followed the subcutaneous injection of larger amounts. A long needle of about two and a half inches attached to a large antitoxin syringe may be used, and the injection should be made in the median line between the fourth and fifth lumbar vertebral spines. Injections by this or any other method should be given under rigid aseptic precautions, and repeated as soon as the temporary beneficial effects of the previous dose have passed. The use of this method does not preclude the subcutaneous injections, especially after the first few days of treatment. As the disease lasts for ten days or more in the cases that recover, the injections should be continued until the patient is definitely convalescent. Bromide and chloral in fair sized doses should be administered, and amyl nitrite in glass capsules should be constantly at hand for immediate administration by inhalation if a laryngeal spasm occurs. Many cases doing well have died during such spasms.

BIRTH CERTIFICATES OF CHILDREN DYING SOON AFTER BIRTH—It is found that not a few certificates of death have been filed in the office of the State Department of Health of deaths occurring from a few minutes to a week after birth, for which children there is no return made of their birth. The attention of local registrars is called to this, and they are requested to note that it is required that a certificate of birth be made and filed of every living born child regardless of age.

THE MAY MORTALITY has decreased from April to a death rate of 16.1 from 16.8, with a daily average saving of 18 deaths. The saving has been in all diseases of the respiratory organs, including consumption, in deaths reported from old age and enfeebled conditions. *Pneumonia* caused 1084 deaths, a daily average of 35 deaths against 40 in the first three months of the year. Consumption is a little below the average for the month. *Bright's disease* caused 509 deaths, and the mortality from diseases of the urinary organs is rather excessive. *Grippe* probably caused 1000 deaths, or 200 less than in April. *Smallpox* caused 3 deaths, all occurring in Rochester, but no new cases have been reported from there since May 25th. Recently reported cases have been from towns in Delaware and Chautauqua counties; from St. Regis Falls and Malone, Franklin county; one in Freeport, Long Island; one at Cohoes and at Mechanicville; at Friendship, Allegany county, 1, who escaped from quarantine in Pennsylvania; at Windsor, Broome county, 1; and at Elmira and Dansville cases originating from a recently detected outbreak in towns in Livingston county which has secured considerable headway. Salutary treatment, by press report, has been administered to several persons by Pennsylvania courts in localities adjoining our border, who on conviction of breaking quarantine were sentenced to four months' imprisonment and a fine in addition.

MONTHLY BULLETIN OF THE NEW YORK STATE

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
MARITIME DISTRICT										
Totals	4,052,875	5,452	16.4	1,936	35.5	524	170	20	31	10
CITY OF NEW YORK										
Totals	3,732,903	5,084	16.2	1,839	36.0	446	177	16	30	10
BOROUGH OF MANHATTAN	1,917,676	2,765	17.5	985	35.6	207	158	10	21	5
BOROUGH OF THE BRONX	268,341	340	15.3	104	30.6	43	180	3	1	2
BOROUGH OF BROOKLYN	1,219,597	1,682	15.8	671	40.0	172	215	3	6	1
BOROUGH OF QUEENS	182 681	221	14.6	59	27.0	24	165	....	2	1
BOROUGH OF RICHMOND	72,608	76	12.8	20	26.3	10	120	....	....	1
Oyster Bay	16,334	2	......	0	......	1	......	....	....	....
Hempstead	27,066	42	19.0	16	38.0	7	95	....	....	....
North Hempstead	12,048	12	......	3	25.0	4	......	....	....	....
Southold	8,301	7	......	2	28.5	4	142	....	....	....
Sag Harbor	3,500	2	......	1	50.0	0	......	....	....	....
Huntington	9,483	7	......	2	28.5	1	285	....	....	....
Brookhaven	14,592	18	......	6	33.3	6	111	....	....	....
YONKERS	50,000	52	12.6	16	30.8	9	135	1	....	....
Greenburgh	15,564	15	......	4	33.3	2	......	....	....	....
MOUNT VERNON	20,346	23	14.0	5	21.7	3	174	....	....	....
Port Chester	7,440	7	......	6	85.7	0	285	....	....	....
Ossining	7,939	15	......	2	13 3	2	......	....	....	....
NEW ROCHELLE	14,720	21	......	6	28.5	3	185	....	....	....
Peekskill	10,358	12	......	0	......	1	......	....	....	....
White Plains	7,900	9	......	5	55.5	0	222	2	....	....
Rest of District	94,382	124	18.0	23	18.5	36	80	1	1	....
HUDSON VALLEY DIST.										
Totals	696,000	764	14.0	160	20.0	164	72	4	7	1
ALBANY	100,000	119	14.5	28	23.7	13	50	2	....	....
COHOES	24,000	41	21.3	12	29.0	2	120	....	....	....
TROY	75,057	109	17.7	21	18.3	12	83	1	2	....
WATERVLIET	14,321	11	......	2	18.2	3	90	....	....	....
Green Island	4,770	8	......	1	12.5	1	......	....	....	....
Hoosick Falls	5,671	5	......	0	......	2	......	....	....	....
RENSSELAER	7,466	13	......	4	30.0	1	150	....	....	....
Coxsackie	4,102	3	......	0	......	2	......	....	....	....
Catskill	5,486	3	......	0	......	0	......	....	....	....
HUDSON	9,528	11	......	2	18.2	4	182	....	....	....
KINGSTON	24,535	34	17.0	7	20.6	8	175	....	1	1
Ellenville	3,000	3	......	1	......	0	......	....	....	....
Marbletown	3,511	4	......	1	25.0	1	......	....	....	....
Rosendale	6,278	9	......	3	......	0	......	....	....	....
Esopus	4,907	2	......	1	......	0	......	....	....	....
Saugerties	3,700	2	......	0	......	1	......	....	....	....
POUGHKEEPSIE	24,029	27	14.0	6	22.2	5	330	....	....	....
Fishkill	13,016	5	......	2	......	2	......	....	....	....
Wappingers Falls	3,504	1	......	0	......	1	......	....	....	....
NEWBURGH	25,000	39	19.1	9	23.1	8	77	....	....	....
Port Jervis	9,385	11	......	2	18.2	4	360	....	3	....
MIDDLETOWN	14,522	14	......	3	21.4	3	70	....	....	....
Warwick	6,403	11	......	0	......	3	......	....	....	....
Goshen	4,564	9	......	0	......	0	......	....	....	....
Montgomery	5,939	10	......	4	40.0	4	100	....	....	....
Haverstraw	9,874	7	......	2	......	1	......	....	....	....
Nyack	4,275	9	......	2	22.2	2	......	....	....	....
Ramapo	7,502	12	......	1	......	1	......	....	....	....
Rest of District	271,800	232	10.5	44	20.0	80	50	1	1	....

DEPARTMENT OF HEALTH—VOLUME XIX

districts, cities, villages and towns during June, 1903

villages in *italic* and towns in Roman type.]

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	80	67	16	32	212	473	559	619	50	252	453	466	439	236	339	65	1,033
....	76	64	15	30	201	460	533	576	41	231	423	431	385	218	309	50	985
....	30	27	14	11	98	221	283	283	23	128	230	254	220	126	180	17	584
....	10	2		4	10	28	40	90	3	9	20	17	19	14	20	2	46
....	30	34	1	13	81	192	185	170	15	68	151	126	127	63	87	23	307
....	6	1			11	14	18	21		21	17	25	19	18	14	7	31
....				2	1	5	7	12		5	5	9		8	8	1	17
....											2						
....		2			1	1	2	2			4	4	9	2	2	1	12
....								1	1	2	1	1	3		1	1	1
....				1							1	1	1	1			2
....							1	1									
....				1	1		2	1	1			1					
....					2		2	3				4	1	1	1	3	1
....					3	3	4	12		3	3	5	6	5	2		5
....			1					3		2	1	1	1		2	1	3
....						4		3	2	3	2	2	3	2			2
....						2			1	2							2
....							3	2		3		1	2	1	1		2
....	1	1			2		1		1	1	2	2	2		5		3
....							1	2	1		3		3	1	1		
....							2		1	1					1		2
....	3				2	3	8	13	1	4	11	13	23	5	14	9	13
....	8	8	3	4	8	14	79	70	6	59	76	108	104	40	50	29	91
....		4					15	14	1	5	12	23	8	8	8	5	14
....	2			1		2	4	6		6	2	2	3	2	3	1	7
....	1			1	2	2	12	17		6	6	15	14	4	6	4	16
....					1		1			1	1	2	2	1		1	1
....								4				1	2				1
....							2				1	2					
....					1	1	2	1		1			1	1	4	1	
....							1							1		1	
....								1			1						1
....		2									1	2	3	2		1	
....	4						1	3		4	4	8	6	1	1		5
....						1	1										1
....										1	1	1					1
....						1	1			2		1	1		1		2
....							1	1									
....													2				
....	1						4	1		3	1	4	4	3	3	1	2
....													3	1	1		
....										1							
....			1			2	2	12		4	7	3	3				5
....					1				1	1	1	1				2	1
....				1			1	1		2		1	1	1		1	4
....											3	4	2		2		
....									1		1	2	3		1		1
....			1					1			1	3			1		3
....							2			1		2		1			1
....										1	1	2	1	1	1		2
....							2	2		1	2	1	2				2
...		2	1	1	3	5	27	6	3	18	30	28	43	13	18	11	21

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
ADIRONDACK AND NORTHERN DISTRICT										
Totals	394,772	396	12.5	56	14.3	118	60	1	5	....
WATERTOWN	21,700	22	12.5	2	9.0	7	90	....	2	....
Ellisburgh	3,868	3	....	1	33.3	2	....	....	....	....
Cape Vincent	2,832	5	....	1	20.0	1	200	....	1	....
Clayton	4,318	2	....	1	50.0	0	....	....	....	....
OGDENSBURGH	12,633	17	15.0	5	30.0	2	115	1	....	....
Gouverneur	6,000	7	....	0	....	2	142	....	....	....
Potsdam	3,848	....	....	....	....	....	....	....	....	....
Canton	6,387	5	....	0	....	2	....	....	....	....
Malone	5,935	11	....	0	....	2	90	....	....	....
Plattsburgh	8,434	8	....	5	62.5	1	125	....	....	....
Glens Falls	12,613	18	....	3	16.6	3	55	....	1	....
Whitehall	4,377	5	....	0	....	0	....	....	....	....
Fort Edward	5,216	10	....	1	10.0	2	100	....	....	....
Sandy Hill	4,473	6	....	0	....	0	....	....	....	....
Granville	5,217	2	....	0	....	0	....	....	....	....
Greenwich	4,172	5	....	0	....	3	200	....	....	....
Lowville	3,746	3	....	0	....	3	....	....	....	....
Rest of District	279,000	267	12.0	37	14.0	87	45	....	1	....
MOHAWK VALLEY DIST.										
Totals	420,000	475	13.5	101	18.7	123	51	1	3	....
SCHENECTADY	47,625	69	17.6	26	37.0	6	315	....	1	....
Cobleskill	3,973	4	....	3	75.0	0	250	....	....	....
AMSTERDAM	20,929	23	13.5	6	26.0	5	218	....	....	....
Fort Plain	2,444	2	....	0	....	0	....	....	1	....
JOHNSTOWN	10,130	6	....	2	33.3	1	....	....	....	....
GLOVERSVILLE	18,349	22	14.5	5	22.5	5	....	....	....	....
LITTLE FALLS	10,381	22	....	3	13.4	9	90	....	....	....
Herkimer	5,555	4	....	1	25.0	2	250	....	....	....
Ilion	5,138	5	....	1	20.0	1	200	....	....	....
UTICA	56,383	70	15.0	18	25.8	10	435	1	1	....
Whitestown	6,235	3	....	1	....	1	....	....	....	....
ROME	15,343	25	....	4	16.0	12	....	....	....	....
Boonville	3,332	2	....	1	50.0	0	....	....	....	....
Camden	3,745	3	....	1	....	0	....	....	....	....
Waterford	6,157	8	....	2	25.0	0	....	....	....	....
Mechanicville	4,695	1	....	0	....	0	....	....	....	....
Ballston Spa	3,923	3	....	0	....	0	....	....	....	....
Saratoga Springs	12,409	21	....	1	5.0	5	....	....	....	....
Rest of District	183,250	182	11.5	26	14.0	66	35	....	....	....
SOUTHERN TIER DISTRICT										
Totals	429,530	434	12.1	60	13.5	133	75	1	7	....
BINGHAMTON	39,647	47	14.3	8	17.0	9	20	....	....	....
Owego	5,039	8	....	2	25.0	1	250	....	....	....
Candor	3,330	2	....	0	....	1	....	....	....	....
Waverly	4,465	7	....	1	14.2	2	142	....	....	....
ELMIRA	35,672	36	13.0	4	11.1	6	140	....	3	....
Horseheads	4,944	3	....	0	....	2	....	....	....	....
HORNELLSVILLE	12,000	7	....	1	14.2	1	142	....	....	....
Bath	5,000	4	....	0	....	2	....	....	....	....
CORNING	11,061	17	....	0	....	7	55	....	....	....
Wellsville	5,000	7	....	2	50.0	3	....	....	....	....
OLEAN	9,462	11	....	1	9.0	4	....	....	....	....
Salamanca	4,251	8	....	2	25.0	1	125	....	....	....
DUNKIRK	11,616	18	....	7	38.8	2	111	....	....	....

FOR JUNE—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	2	4	1	....	2	8	35	45	5	33	19	54	54	20	30	37	40
....	....	....	....	....	....	....	4	1	....	3	....	5	4	....	1	2	....
....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	1	1
....	....	....	....	....	....	....	....	....	....	1	....	1	....	1	....	....	1
....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
....	....	....	....	....	....	1	2	2	....	....	1	3	1	1	....	2	3
....	....	....	....	....	....	1	....	1	....	....	....	....	4	....	1	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	1	....	....	1	....	....	2	....	....	1	....
....	1	....	....	....	....	....	....	2	....	2	1	4	1	....	....	....	....
....	....	....	....	....	....	1	1	1	....	....	....	1	1	....	....	....	3
....	....	....	....	....	....	....	....	3	....	2	....	1	3	2	3	1	3
....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	4	....	....
....	....	....	....	....	....	1	1	....	....	1	....	2	3	....	1	1	....
....	....	....	....	....	....	....	....	....	....	1	....	3	1	....	1	....	....
....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....	....
....	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	3	....
....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	1
....	....	4	1	....	2	4	25	35	4	21	16	31	35	15	20	26	27
....	1	2	1	8	7	19	40	46	6	45	48	52	63	21	27	33	53
....	....	2	....	....	4	15	5	7	3	3	3	6	6	1	5	2	6
....	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	1	1
....	1	....	1	1	1	1	2	3	1	1	....	4	1	1	....	2	4
....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	3	1	....	....	....	2
....	....	....	....	....	....	....	3	1	....	1	3	2	6	1	1	3	2
....	....	....	....	1	1	....	2	2	....	2	4	2	1	1	1	1	4
....	....	....	....	....	1	....	....	....	....	....	....	2	....	....	....	1	....
....	....	....	....	1	....	....	1	....	....	1	1	....	1	....	....	....	....
....	....	....	....	1	....	....	3	3	1	4	11	10	12	3	5	....	10
....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	1
....	....	....	....	....	....	....	3	2	....	1	....	2	6	2	1	6	2
....	....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....	....
....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	2
....	....	....	....	....	....	....	....	....	....	1	1	1	2	....	....	....	2
....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1	....	1
....	....	....	....	....	....	....	1	4	....	3	4	2	3	1	....	3	....
....	....	....	....	3	....	3	18	18	1	27	21	16	21	10	13	15	16
....	....	1	3	6	6	7	31	31	3	33	29	68	64	23	33	39	58
....	....	....	....	....	....	1	5	6	....	4	5	6	10	1	1	1	7
....	....	....	1	1	....	....	....	....	....	1	....	....	1	....	1	....	3
....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....
....	....	....	....	....	....	1	1	1	....	....	....	1	....	1	1	....	1
....	....	....	....	....	....	2	....	6	....	....	4	7	4	3	3	1	3
....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	1
....	....	....	....	....	1	....	....	1	....	....	....	....	2	1	....	....	2
....	....	....	1	....	....	....	....	....	....	....	....	1	....	1	....	1	....
....	....	1	....	....	....	....	....	2	....	....	3	2	3	2	....	4	....
....	....	....	....	....	....	....	1	1	....	....	....	....	2	....	....	2	1
....	....	....	....	....	....	....	1	....	....	1	....	3	1	....	3	1	1
....	....	....	....	1	....	....	....	....	1	1	1	1	....	1	1	....	1
....	....	....	....	....	....	2	3	1	....	4	1	2	....	....	1	1	3

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
SOUTHERN TIER DISTRICT —(*Continued*)										
JAMESTOWN	22,892	21	11.5	5	23.8	3	143	....	....	....
Westfield	2,480	2	......	0	......	2	......	....	....	....
Fredonia	4,125	1	......	0	......	0	......	1	....	....
Rest of District	248,600	235	12.0	27	11.5	87	50	....	4	....
EAST CENTRAL DISTRICT Totals	403,000	406	12.5	66	16.5	116	70	3	4	....
SYRACUSE	108,874	115	13.0	26	22.6	22	60	1	1	....
Baldwinsville	3,000	2	......	0	......	1	......	....	....	....
DeWitt	5,435	11	......	4	36.5	2	250	1	....	....
Cortland	9,014	8	......	0	......	5	......	....	....	....
Homer	2,381	5	......	1	20.0	2	200	....	....	....
ONEIDA	7,942	12	......	0	......	4	......	....	....	....
Hamilton	3,744	4	......	1	25.0	3	250	....	....	....
Cazenovia	3,890	5	......	0	......	2	......	....	....	....
Canastota	3,300	3	......	1	......	2	333	....	....	....
Norwich	5,766	8	......	2	25.0	3	250	....	....	....
Oneonta	7,147	4	......	0	......	0	......	1	....	....
Worcester	2,409	2	......	0	......	0	......	1	....	....
Cooperstown	2,368	3	......	0	......	2	......	....	....	....
Walton	4,869	8	......	0	......	0	......	....	1	....
Delhi	3,243	1	......	0	......	0	......	....	....	....
Liberty	4,568	15	......	1	......	0	......	....	....	....
Rest of District	225,540	205	11.0	30	15.0	69	50	1	....	....
WEST CENTRAL DISTRICT Totals	820,600	390	14.6	51	15.6	143	55	....	4	....
AUBURN	35,000	47	16.8	12	25.5	7	150	....	....	....
ITHACA	13,136	8	......	0	......	2	......	....	....	....
Hector	4,137	8	......	0	......	5	......	....	....	....
Waterloo	4,256	4	......	0	......	2	......	....	....	....
Seneca Falls	6,519	10	......	2	20.0	5	100	....	....	....
GENEVA	10,433	18	......	2	11.1	3	111	....	....	....
Canandaigua	6,151	15	......	2	14.2	6	......	....	....	....
Manchester	4,733	4	......	0	......	2	......	....	....	....
Phelps	4,788	4	......	1	25.0	2	......	....	....	....
Penn Yan	4,650	4	......	0	......	3	......	....	....	....
Batavia	9,180	9	......	4	44.4	0	......	....	....	....
Dansville	3,633	9	......	1	11.1	0	111	....	....	....
LeRoy	3,144	5	......	2	......	1	......	....	....	....
Warsaw	4,341	8	......	1	12.5	2	......	....	....	....
Rest of District	206,500	237	13.6	25	10.2	103	50	....	4	....
LAKE ONTARIO AND WESTERN DISTRICT Totals	898,819	968	13.1	169	17.5	212	111	6	13	....
BUFFALO	370,000	406	13.5	74	18.0	65	125	4	9	....
TONAWANDA	7,421	3	......	0	......	0	......	....	....	....
Amherst	4,223	6	......	0	......	4	......	....	....	....
NORTH TONAWANDA	9,069	8	......	1	......	0	......	....	....	....
LOCKPORT	16,581	15	......	3	20.0	5	66	....	....	....
NIAGARA FALLS	19,457	25	15.5	8	36.0	2	280	....	2	....
Medina	4,716	3	......	0	......	0	......	....	....	....
Albion	4,477	6	......	2	33.3	2	......	....	....	....
Brockport	3,400	2	......	0	......	1	......	....	....	....
ROCHESTER	162,608	203	15.6	44	21.8	40	120	....	1	....
Palmyra	3,758	7	......	3	42.8	2	142	....	....	....

FOR JUNE—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal disease	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	1	2	......	8	8	....	2	1	1	......	1	8	....	4
....	....	....	....	....	....	......	......	......	....	1	....	......	1	....	......	....	......
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	......
....	....	....	1	8	3	1	17	10	2	19	14	40	40	12	19	25	25
....	5	2	1	5	4	4	29	40	8	42	43	72	87	16	19	27	50
....	....	....	....	....	2	1	6	18	1	7	16	19	5	5	9	7	20
....	....	....	....	....	....	......	......	1	....	......	1	......	......	....	......	....	......
....	....	....	....	1	....	......	......	2	....	1	1	1	1	....	......	....	8
....	....	....	....	....	....	......	......	......	....	......	....	4	1	....	......	2	1
....	....	....	....	....	1	......	2	......	....	......	....	......	......	....	......	1	1
....	....	....	....	....	....	......	1	2	....	1	1	1	4	1	......	1	......
....	1	....	....	....	....	......	1	......	....	......	....	1	......	....	......	1	......
....	....	....	....	....	....	......	1	1	....	......	....	......	2	1	......	....	......
....	....	....	....	....	....	1	......	......	....	......	....	1	......	....	......	1	......
....	....	1	....	....	1	......	1	......	....	......	1	2	......	....	......	....	2
....	....	....	....	....	....	......	......	......	....	1	....	......	2	....	......	....	......
....	1	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	......
....	....	....	....	....	....	......	......	......	....	1	2	......	......	....	......	....	......
....	....	....	....	....	....	......	1	1	....	......	....	......	......	....	......	....	......
....	....	....	....	....	....	......	......	......	....	1	....	......	......	....	......	....	......
....	....	....	....	....	....	......	1	5	1	2	....	3	1	....	2	....	......
....	8	1	1	2	....	2	15	15	1	28	21	40	21	9	8	14	23
....	1	7	....	4	4	8	27	85	4	89	29	47	56	27	21	29	53
....	1	1	....	....	8	2	2	7	....	4	1	5	4	4	8	8	7
....	....	....	....	....	....	......	......	1	....	1	....	......	1	1	2	....	2
....	....	....	....	....	....	......	1	......	....	1	....	1	2	2	1	....	......
....	....	....	....	....	....	......	1	......	....	1	....	......	1	....	1	....	......
....	....	....	....	....	1	......	......	......	....	2	1	1	2	1	......	....	2
....	....	2	....	....	....	......	4	......	....	2	....	8	8	....	1	....	8
....	....	....	....	....	....	......	8	8	....	1	1	......	1	2	1	2	1
....	....	....	....	....	....	......	......	......	....	......	1	1	2	....	......	....	......
....	....	....	....	....	....	......	......	......	....	......	1	1	1	....	......	....	1
....	....	....	....	....	....	......	......	......	....	......	1	......	1	1	......	1	......
....	....	....	....	....	....	......	1	2	....	1	1	......	1	....	......	....	3
....	....	1	....	....	....	......	1	......	....	1	1	2	1	1	......	....	1
....	....	....	....	....	....	......	......	1	....	1	1	......	......	....	......	....	2
....	....	....	....	....	....	......	......	......	....	1	1	8	......	....	......	....	8
....	....	8	....	4	....	1	14	21	4	23	19	80	86	15	12	23	23
2	5	18	5	12	21	32	94	92	11	78	60	110	107	67	75	62	106
....	1	4	2	8	7	21	42	44	5	25	23	85	42	85	29	25	50
....	....	....	....	....	....	......	......	1	....	......	1	......	......	....	......	....	1
....	....	....	....	....	....	......	2	......	....	......	....	1	......	1	1	1	......
....	....	....	....	....	1	......	1	......	....	1	....	1	......	1	8	....	......
....	....	....	....	1	....	......	1	1	1	8	2	......	1	1	......	3	1
....	1	....	....	....	....	4	4	1	....	1	2	4	......	1	2	....	8
....	....	....	....	....	....	......	......	......	....	1	1	1	......	....	......	....	......
....	....	....	....	....	....	......	2	1	....	......	....	1	......	....	......	....	2
....	....	....	....	....	....	......	1	......	....	......	....	......	......	....	......	....	1
2	....	8	2	2	6	4	25	18	2	19	17	23	22	11	9	11	25
....	....	....	....	1	....	......	......	1	....	2	....	1	1	....	......	....	1

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
LAKE ONTARIO AND WESTERN DIST.—(*Con.*)										
Newark	4,578	5	......	1	20.0	0	......	....	....	....
Lyons	5,824	5	......	0	......	0	......	....	....	....
Clyde	2,507	5	......	1	20.0	1	200	....	....	....
OSWEGO	22,200	23	13.2	3	13.0	4	130	1	....	....
FULTON	8,734	15	......	1	6.6	7	66	....	....	....
Richland	3,535	2	......	0	......	2	......	....	....	....
Rest of District	244,184	224	11.5	28	12.5	77	80	1	1	....
Total for the State	7,910,000	9,285	14.5	2,453	26.5	1,533	135	36	74	11
Average for past 5 years	....	9,293	15.8	2,811	30.2	1,457	134	58	79	28

REMARKS—The exceedingly dry weather of May continued through the first week of June, after which there were few days on which rain failed to fall and in the eastern and northern parts of the State there was a precipitation of more than six inches, or double the normal, and there were few days without rainfall. This was less marked in the western part of the State. The mean temperature was but little

FOR JUNE—(*Concluded*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	......	......	......	....	......	1	......	1	....	8	....	....
....	....	....	....	....	....	......	......	......	....	......	....	1	1	....	8	....	....
....	1	....	....	....	....	......	......	1	....	......	1	......	1	....	......	1	....
....	....	....	....	1	1	......	1	3	....	1	....	2	5	1	2	1	4
....	....	....	....	1	....	......	......	1	....	8	....	8	2	....	8	2	....
....	....	....	....	....	....	......	......	......	....	......	....	......	......	1	......	1	....
....	2	1	1	8	6	8	15	20	3	17	12	87	81	15	20	17	19
2	102	104	80	71	264	560	894	978	88	576	757	970	924	450	594	820	1,480
80	95	103	29	79	225	524	941	1,069	87	788	716	866	1,081	400	650	869	1,221

higher than that of May, and the average mean highest temperature was the same as in May, 70 degrees; the mean lowest, 46 degrees. Instead of the abundant sunshine of May there were but five clear days in the month. Wind was more generally easterly and moderate.

MONTHLY BULLETIN OF THE NEW YORK STATE

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
MARITIME DISTRICT										
Totals	4,052,875	6,723	19.6	2,851	42.4	551	271	26	58	8
CITY OF NEW YORK										
Totals	3,732,903	6,234	19.6	2,698	43.3	462	279	25	56	8
BOROUGH OF MANHATTAN	1,917,676	3,190	19.6	1,412	44.3	218	254	12	18	2
BOROUGH OF THE BRONX	268,341	444	19.5	117	26.4	31	234	3	5	1
BOROUGH OF BROOKLYN	1,219,597	2,165	19.7	955	44.1	178	314	7	32	4
BOROUGH OF QUEENS	182,681	274	17.5	130	47.4	22	303	3	1	1
BOROUGH OF RICHMOND	72,608	161	26.1	84	52.2	13	391	....	....	....
Oyster Bay	16,334	30	......	4	13.3	4	33	....	....	....
Hempstead	27,066	40	17.4	11	27.5	7	225	....	....	....
North Hempstead	12,048	31	......	9	29.0	6	65	....	....	....
Southold	8,301	5	......	0	......	3	200	....	....	....
Sag Harbor	3,500	5	......	4	80.0	0	......	....	....	....
Huntington	9,483	14	......	3	21.4	2	71	....	....	....
Brookhaven	14,592	20	......	1	5.0	8	......	....	....	....
YONKERS	50,000	100	23.6	58	58.0	9	370	....	....	....
Greenburgh	15,564	21	......	10	47.6	2	286	....	....	....
MOUNT VERNON	20,346	27	15.7	8	29.6	6	222	....	....	....
Port Chester	7,440	......	......	......	......	......	......	....	....	....
Ossining	7,939	14	......	4	28.6	3	71	....	....	....
NEW ROCHELLE	14,720	20	......	9	45.0	1	250	1	1	....
Peekskill	10,358	15	......	4	26.7	2	......	....	....	....
White Plains	7,900	7	......	2	28.6	2	......	....	....	....
Rest of District	94,382	140	17.5	26	18.6	34	86	....	1	....
HUDSON VALLEY DIST.										
Totals	696,000	996	16.9	257	25.8	197	177	....	17	1
ALBANY	100,000	175	20.7	54	30.9	24	183	....	1	....
COHOES	24,000	43	21.1	21	48.8	2	326	....	1	....
TROY	75,057	141	22.1	39	27.7	20	227	....	6	....
WATERVLIET	14,321	25	......	12	48.0	2	320	....	....	....
Green Island	4,770	8	......	3	37.5	1	125	....	....	....
Hoosick Falls	5,671	4	......	2	50.0	1	500	....	....	....
RENNSSELAER	7,466	16	......	5	31.3	3	188	....	....	....
Coxsackie	4,102	9	......	0	......	1	111	....	1	....
Catskill	5,486	8	......	3	37.5	0	250	....	....	....
HUDSON	9,528	13	......	4	30.8	0	154	....	....	....
KINGSTON	24,535	37	17.8	11	29.7	4	216	....	....	....
Ellenville	3,000	1	......	0	......	0	......	....	....	....
Marbletown	3,511	4	......	1	25.0	1	250	....	....	....
Rosendale	6,278	5	......	0	......	0	200	....	....	....
Esopus	4,907	9	......	0	......	2	111	....	....	....
Saugerties	3,700	5	......	0	......	2	......	....	....	....
POUGHKEEPSIE	24,029	50	24.5	15	30.0	7	140	....	....	1
Fishkill	13,016	20	......	5	25.0	5	350	....	....	....
Wappingers Falls	3,504	8	......	2	25.0	2	125	....	....	....
NEWBURGH	25,000	42	19.7	16	38.1	5	310	....	1	....
Port Jervis	9,385	13	.....	3	23.1	2	231	....	1	....
MIDDLETOWN	14,522	24	......	2	8.3	4	42	....	....	....
Warwick	6,403	6	......	1	16.7	1	500	....	3	....
Goshen	4,564	8	......	0	......	5	......	....	....	....
Montgomery	5,939	10	......	2	20.0	1	200	....	....	....
Haverstraw	9,874	6	......	3	50.0	2	......	....	....	....
Nyack	4,275	5	......	0	......	1	......	....	....	....
Ramapo	7,502	7	......	3	42.9	0	286	....	....	....
Rest of District	271,800	294	13.1	50	17.0	99	99	....	3	....

DEPARTMENT OF HEALTH—VOLUME XIX

districts, cities, villages and towns during July, 1903

villages in *italic* and towns in Roman type]

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	57	67	14	20	181	1,391	579	644	56	292	498	489	456	244	583	72	988
....	55	66	14	19	175	1,323	560	595	51	256	459	426	379	228	538	49	952
....	17	35	7	7	87	626	339	279	29	134	222	235	172	130	278	21	540
....	9	2	1	1	8	74	24	111	6	11	27	21	23	18	42	3	54
....	26	25	5	8	73	500	172	178	15	94	175	133	148	68	174	17	306
....	2	2	1	1	4	68	15	13	....	9	25	28	29	8	23	5	36
....	1	2	....	2	3	55	10	9	1	8	10	9	7	4	21	3	16
....	....	....	....	....	....	1	1	7	1	2	5	5	2	1	2	1	2
....	1	....	....	....	1	7	....	3	....	....	2	5	12	....	6	....	3
....	....	....	....	....	....	2	1	2	....	3	3	5	5	1	5	1	3
....	....	....	....	....	....	1	....	1	....	....	1	1	1	....	....	....	....
....	....	....	....	....	....	....	1	1	....	1	1	....	....	....	....	....	1
....	....	....	....	....	....	1	2	1	1	1	2	3	....	....	2	1	....
....	....	....	....	....	....	....	....	1	....	....	2	3	3	1	4	6	....
....	....	....	....	....	2	35	5	8	1	12	7	8	7	3	4	1	7
....	....	....	....	....	1	5	1	1	....	1	2	1	3	1	2	....	3
....	....	....	....	....	....	6	2	1	....	1	....	4	5	2	3	2	1
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	1	....	....	....	1	....	2	....	3	3	....	2	....	2
....	....	1	....	....	1	1	2	2	....	3	2	....	1	....	....	....	5
....	....	....	....	....	....	....	1	3	....	1	2	....	3	1	2	1	1
....	....	....	....	....	....	....	1	1	1	2	1	....	....	....	1	....	....
....	1	....	....	....	1	9	2	16	1	7	9	25	32	6	12	10	8
....	8	3	....	9	11	127	70	90	7	71	72	120	130	38	74	54	94
....	....	2	....	1	....	28	23	14	1	18	15	17	10	10	15	6	14
....	1	....	....	....	....	12	2	5	....	3	....	2	3	5	2	1	6
....	1	....	....	....	5	20	6	18	2	14	8	20	21	2	7	3	8
....	....	....	....	1	....	7	2	1	....	1	1	2	....	1	4	2	3
....	....	....	....	....	....	1	....	....	....	1	....	....	2	1	1	....	2
....	....	....	....	....	....	2	....	....	....	....	....	1	....	....	....	1	....
....	....	....	....	....	....	3	....	1	....	3	1	1	2	1	....	3	1
....	....	....	....	....	....	....	1	1	....	....	1	1	2	....	2	....	....
....	....	....	....	....	....	2	....	1	....	....	....	....	3	....	....	....	2
....	....	....	....	1	....	1	1	....	....	3	1	3	1	....	....	....	2
....	3	....	....	....	....	5	2	2	1	1	3	4	6	2	2	1	5
....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....
....	....	....	....	....	....	1	....	1	....	....	....	....	1	....	1	....	....
....	1	....	....	....	....	....	....	1	....	....	....	1	1	....	1	....	....
....	....	....	....	....	....	1	....	....	....	2	....	1	3	....	1	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	4	....	1	....	....
....	1	....	....	1	....	4	4	10	....	3	4	2	5	3	2	1	9
....	....	....	....	....	....	7	1	3	....	....	1	....	1	2	3	....	2
....	....	1	....	....	....	....	3	1	....	....	....	1	1	....	....	....	1
....	....	....	....	1	....	11	3	2	....	2	3	2	4	....	5	3	5
....	....	....	....	....	....	2	1	3	....	....	....	1	3	1	....	....	1
....	....	....	....	....	....	1	2	3	....	2	1	3	6	1	3	1	1
....	....	....	....	....	....	....	....	....	....	....	1	1	1	....	....	....	....
....	....	....	....	....	....	....	2	1	....	....	....	1	1	....	1	1	1
....	....	....	....	....	1	1	....	....	....	1	....	3	3	....	....	1	....
....	....	....	....	....	....	....	....	1	....	1	....	1	1	....	....	....	....
....	....	....	....	....	....	....	....	2	....	....	1	....	1	1	....	....	2
....	....	....	....	1	....	1	2	....	....	....	....	....	....	....	3	....	....
....	1	....	....	3	5	17	15	19	3	16	30	52	44	8	20	30	28

MONTHLY BULLETIN

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
ADIRONDACK AND NORTHERN DISTRICT Totals	394,772	419	12.6	68	16.2	112	95	....	10	....
WATERTOWN	21,700	25	13.6	5	20.0	8	160	....	1	....
Ellisburgh	3,888	8	......	0	......	1	......	....	....	....
Cape Vincent	2,882	5	......	0	......	3	200	....	1	....
Clayton	4,313	8	......	1	12.5	8	......	....	....	....
OGDENSBURG	12,633	10	9.4	2	20.0	1	200	....	....	...
Gouverneur	6,000	10	......	1	10.0	3	200	....	1	....
Potsdam	3,843	7	......	1	14.3	1	......	....	....	....
Canton	6,337	2	......	0	......	0	500	....	1	....
Malone	5,935	5	......	3	60.0	1	......	....	....	....
Plattsburg	8,434	7	......	2	28.6	1	143	....	....	....
Glens Falls	12,613	16	15.0	4	25.0	3	313	....	....	....
Whitehall	4,377	0	......	0	......	0	......	....	....	....
Fort Edward	5,216	2	......	0	......	1	......	....	....	....
Sandy Hill	4,473	6	......	0	......	3	......	....	....	....
Granville	5,217	6	......	0	......	2	167	....	....	....
Greenwich	4,172	11	......	1	9.1	3	......	....	....	....
Lowville	3,746	8	......	0	.....	2	......	....	....	....
Rest of District	279,000	288	12.1	48	16.7	81	80	....	6	....
MOHAWK VALLEY DIST. Totals	420,000	529	14 8	155	29.3	127	181	....	3	....
SCHENECTADY	47,625	91	22.5	54	59.3	9	451	....	....	....
Cobleskill	3,973	2	......	1	50.0	0	......	....	....	....
AMSTERDAM	20,929	40	22.4	14	35.0	1	250	....	....	....
Fort Plain	2,444	1	......	0	......	0	......	....	....	....
JOHNSTOWN	10,130	13	......	2	15.4	6	231	....	....	....
GLOVERSVILLE	18,349	28	18.1	8	28.6	5	107	....	....	....
LITTLE FALLS	10,381	......	......	......	......	......	......	....	....	....
Herkimer	5,555	2	......	1	50.0	0	500	....	....	....
Ilion	5,138	11	......	4	36.4	3	182	....	....	....
UTICA	56,383	77	15.9	26	33.8	14	195	....	....	....
Whitestown	6,235	3	......	0	......	1	......	....	....	....
ROME	15,343	22	16.9	6	27.3	11	91	....	....	....
Boonville	3,332	7	......	1	14.3	3	......	....	....	....
Camden	3,745	0	......	0	......	0	......	....	....	....
Waterford	6,157	6	......	3	50.0	0	......	....	....	....
Mechanicville	4,695	3	......	1	33.3	0	333	....	....	....
Ballston Spa	3,923	4	......	0	......	1	......	....	....	....
Saratoga Springs	12,409	27	......	2	7.4	8	37	....	....	....
Rest of District	183,250	198	13.1	33	16.6	65	88	....	3	....
SOUTHERN TIER DISTRICT Totals	429,530	459	12.6	88	19.2	137	122	....	6	....
BINGHAMTON	39,647	58	17.1	8	13.8	14	155	....	....	....
Owego	5,039	6	......	1	16.7	1	......	....	....	....
Candor	3,330	2	......	0	......	1	......	....	....	....
Waverly	4,465	4	......	0	......	2	......	....	....	....
ELMIRA	35,672	36	11.9	10	27.8	6	83	....	....	....
Horseheads	4,944	2	......	0	......	1	......	....	....	....
HORNELLSVILLE	12,000	19	......	2	10.5	3	211	....	1	....
Bath	5,000	4	......	1	25.0	3	......	....	....	....
CORNING	11,061	19	......	4	21.1	3	158	....	1	....
Wellsville	5,000	6	......	2	33.3	2	......	....	....	....
OLEAN	9,462	7	......	1	14.3	0	286	....	1	....
Salamanca	4,251	8	......	2	25.0	2	125	....	....	....
DUNKIRK	11,616	17	......	8	47.1	3	412	....	....	....

FOR JULY—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	1	....	2	8	24	24	88	2	31	29	49	61	27	20	45	58
....	....	....	....	....	....	8	1	8	....	2	1	8	5	2	1	....	8
....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	1
....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	2	....
....	....	....	....	....	....	....	....	....	....	....	1	1	1	1	....	2	2
....	....	....	....	....	....	2	2	....	....	....	2	....	1	1	....	1	1
....	....	....	....	1	....	....	....	....	....	....	1	2	....	2	2	1	....
....	....	....	....	....	....	....	....	8	....	....	....	1	....	....	....	3	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	1	2
....	....	1	....	....	....	....	....	1	....	....	....	2	8	....	....	....	....
....	....	....	....	....	....	5	1	....	....	3	1	2	1	1	....	....	2
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....
....	....	....	....	....	....	....	2	1	....	....	1	....	2	....	....	....	....
....	....	....	....	....	....	1	....	....	....	....	2	1	....	....	....	....	2
....	....	....	....	....	....	....	....	1	....	....	....	2	6	....	1	....	1
....	....	....	....	....	....	....	....	....	....	1	1	....	2	2	....	1	1
....	....	....	....	1	8	18	17	29	2	25	19	31	39	17	15	34	37
....	6	8	....	17	2	65	28	44	8	40	42	50	80	16	36	38	61
....	2	2	....	2	1	34	7	6	....	2	2	1	9	8	5	1	14
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....
....	2	1	....	2	....	5	3	8	....	3	7	....	5	....	4	1	4
....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....
....	1	....	....	1	....	1	....	....	....	1	2	2	2	....	1	2	....
....	....	....	....	2	....	1	1	1	1	4	....	8	5	8	....	1	6
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....
....	....	....	....	2	....	....	2	1	....	....	2	....	8	1	....	....	....
....	....	....	....	1	1	18	8	7	1	6	5	6	12	8	5	2	12
....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....
....	....	....	....	1	....	1	1	1	....	2	....	4	5	....	....	5	2
....	....	....	....	....	....	....	....	....	....	....	....	1	2	....	....	1	8
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	1	....	....	1	....	2	....	....	2	....	....
....	....	....	....	....	....	1	....	1	....	....	....	1	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	2	....	1	....	1	....	....
....	....	....	....	....	....	1	2	8	....	8	2	4	6	1	4	1	....
....	1	....	....	6	....	7	8	20	1	17	20	25	28	5	13	19	20
....	2	....	....	7	7	84	26	27	6	32	21	64	60	21	35	45	66
....	....	....	....	1	....	8	1	7	8	9	4	5	6	2	1	8	8
....	....	....	....	....	....	....	....	....	....	....	1	2	1	....	1	....	1
....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	1	....	....	....	....	2	....	....	....	1	....
....	....	....	....	....	....	8	4	4	1	8	3	2	2	3	2	2	7
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....
....	....	....	....	....	1	2	2	....	....	8	....	3	4	....	1	1	1
....	....	....	....	....	....	....	....	....	....	....	....	1	1	1	....	....	1
....	....	....	....	....	....	2	....	1	....	2	1	....	4	1	1	8	8
....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	2	2
....	....	....	....	....	....	1	....	....	....	1	....	....	8	....	....	....	1
....	....	....	....	....	....	1	....	....	....	1	....	....	1	....	1	1	8
....	1	....	....	....	....	6	2	....	....	2	....	1	2	1	1	1	....

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
SOUTHERN TIER DISTRICT —(*Continued*)										
JAMESTOWN	22,892	53	27.0	10	18.9	13	132	....	....	....
Westfield	2,430	3	......	2	66.7	1	......	....	....	....
Fredonia	4,125	5	......	2	40.0	2	400	....	....	....
Rest of District	248,600	210	10.0	35	16.7	32	38	....	3	....
EAST CENTRAL DISTRICT Totals	403,000	476	13.9	73	15.3	143	84	1	6	....
SYRACUSE	108,374	144	15.8	42	29.2	21	167	1	2	....
Baldwinsville	3,000	2	......	0	......	0	......	....	....	....
De Witt	5,435	6	......	0	......	2	......	....	....	....
CORTLAND	9,014	12	......	0	......	3	......	....	....	....
Homer	2,381	1	......	0	......	1	......	....	....	....
ONEIDA	7,942	6	......	0	......	2	......	....	....	....
Hamilton	3,744	3	......	0	......	0	......	....	....	....
Cazenovia	3,830	4	......	0	......	1	......	....	....	....
Canastota	3,300	3	......	0	......	0	......	....	....	....
Norwich	5,766	6	......	1	16.7	0	167	....	....	....
Oneonta	7,147	9	......	2	22.2	1	111	....	....	....
Worcester	2,409	7	......	0	......	3	......	....	....	....
Cooperstown	2,368	7	......	1	14.3	4	......	....	....	....
Walton	4,869	8	......	2	25.0	1	......	....	....	....
Delhi	3,243	4	......	1	25.0	0	......	....	....	....
Liberty	4,568	17	......	0	......	5	118	....	1	....
Rest of District	225,540	237	12.4	24	10.1	99	51	....	3	....
WEST CENTRAL DISTRICT Totals	330,600	377	13.9	56	14.9	125	64	....	5	1
AUBURN	35,000	41	13.8	12	29.3	8	98	....	1	....
ITHACA	13,136	22	......	4	18.2	7	......	....	....	....
Hector	4,137	6	......	2	33.3	2	......	....	....	....
Waterloo	4,256	7	......	1	14.3	3	143	....	....	....
Seneca Falls	6,519	3	......	1	33.3	0	......	....	....	....
GENEVA	10,433	11	......	1	9.1	4	......	....	....	....
Canandaigua	6.151	9	......	0	......	3	......	....	....	....
Manchester	4,733	6	......	1	16.7	0	333	....	....	....
Phelps	4,788	3	......	0	......	1	......	....	....	....
Penn Yan	4.650	5	......	1	20.0	3	200	....	1	....
Batavia	9,180	19	......	3	15.8	4	53	....	....	....
Dansville	3,633	5	......	0	......	2	200	....	....	....
Le Roy	3,144	7	......	1	14.3	0	......	....	....	....
Warsaw	4,341	3	......	0	......	0	......	....	....	....
Rest of District	206,500	230	13.2	29	12.6	88	61	....	3	1
LAKE ONTARIO AND WESTERN DISTRICT Totals	893,819	1,155	15.2	324	28.1	232	195	4	21	....
BUFFALO	370,000	513	16.6	197	38.4	47	242	4	10	....
TONAWANDA	7,421	7	......	1	14.3	0	......	....	....	....
Amherst	4,223	1	......	0	......	0	......	....	....	....
NORTH TONAWANDA	9,069	8	......	3	37.5	2	125	....	....	....
LOCKPORT	16,581	18	......	2	11.1	4	222	....	3	....
NIAGARA FALLS	19,457	31	18.6	16	51.6	0	387	....	....	....
Medina	4,716	6	......	0	......	4	......	....	....	....
Albion	4,477	4	......	0	......	1	250	....	1	....
Brockport	3,400	2	......	0	......	1	......	....	....	....
ROCHESTER	162,608	218	15.7	49	22.5	52	243	....	4	....
Palmyra	3,758	2	......	0	......	2	......	....	....	....

FOR JULY—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	5	2	6	6	....	2	4	5	6	2	7	1	7
....	....	....	....	....	....	......	......	......	....	1	....	......	1	....	......	....	1
....	....	....	....	....	....	2	......	1	....	......	....	......	1	....	......	....	1
....	1	....	....	6	1	7	9	8	2	8	8	42	28	11	17	25	34
....	1	1	....	1	1	29	27	45	5	38	30	76	64	26	32	35	58
....	....	....	....	....	1	20	4	16	1	16	10	17	18	7	9	4	23
....	....	....	....	....	....	......	......	......	....	......	1	1	......	....	......	....	......
....	....	....	....	....	....	......	1	......	....	2	....	......	......	....	1	2	......
....	....	....	....	....	....	......	2	2	....	......	1	2	1	1	1	1	1
....	....	....	....	....	....	......	1	......	....	......	....	......	......	....	......	....	......
....	....	....	....	....	....	......	......	......	....	1	2	1	1	....	......	1	......
....	....	....	....	....	....	......	......	......	....	1	....	2	......	....	......	....	......
....	....	....	....	....	....	......	1	1	....	......	....	1	1	....	......	....	......
....	....	....	....	....	....	......	......	......	....	......	....	......	1	....	......	....	2
....	....	1	....	....	....	......	1	......	....	......	....	1	1	1	......	....	1
....	....	....	....	....	....	1	......	1	....	......	....	1	3	1	......	....	2
....	....	....	....	....	....	......	......	2	....	......	2	1	......	....	1	1	......
....	....	....	....	....	....	......	......	1	....	1	2	......	......	1	......	2	......
....	....	....	....	....	....	......	......	2	2	1	....	......	2	1	......	....	......
....	....	....	....	....	....	......	......	......	....	1	....	......	2	....	......	....	1
....	....	....	....	....	....	1	1	3	....	......	....	5	......	1	......	....	......
....	1	....	....	1	....	7	16	13	2	15	12	44	39	13	20	24	28
....	2	1	....	3	2	10	26	25	3	26	27	54	57	28	29	28	50
....	1	....	....	....	....	2	7	1	1	2	....	6	5	3	1	4	7
....	....	....	....	....	....	......	2	2	....	......	....	4	6	1	1	....	6
....	....	....	....	....	....	......	......	1	....	1	2	1	......	....	......	....	1
....	....	....	....	1	....	......	......	......	....	......	3	......	......	1	......	1	1
....	....	....	....	....	....	......	......	......	....	......	....	......	......	1	1	....	1
....	....	....	....	....	....	......	......	......	....	......	2	1	2	1	2	1	2
....	....	....	....	....	....	......	......	......	....	1	1	......	1	1	2	....	3
....	1	....	....	....	....	1	1	......	....	......	....	......	......	2	1	....	......
....	....	....	....	....	....	......	......	......	....	2	....	......	......	1	......	....	......
....	....	....	....	....	....	......	......	......	....	1	....	3	......	....	......	....	......
....	....	....	....	....	....	1	......	......	1	2	3	2	1	3	3	....	3
....	....	1	....	....	....	......	......	......	....	......	1	2	1	....	......	....	......
....	....	....	....	....	....	......	......	......	....	1	1	......	1	....	3	....	1
....	....	....	....	....	....	......	1	......	....	......	....	1	......	....	1	....	......
....	....	....	....	2	2	6	15	21	1	16	14	34	40	14	14	22	25
....	18	12	....	18	27	185	66	78	12	97	89	150	146	68	91	59	79
....	4	6	....	7	9	84	34	33	5	66	40	47	60	31	40	11	22
....	....	....	....	....	....	......	......	1	....	......	1	3	......	....	2	....	......
....	....	....	....	....	....	......	......	......	....	......	1	......	......	....	......	....	......
....	....	....	....	....	....	1	......	......	....	3	1	......	1	....	2	....	......
....	....	....	....	....	....	2	......	2	....	1	2	3	2	....	2	1	1
....	5	....	....	....	1	6	......	2	....	5	....	2	2	2	3	....	3
....	....	....	....	....	....	......	......	2	....	......	1	3	......	....	......	....	......
....	....	....	....	....	....	......	......	1	....	......	2	......	......	....	......	....	......
....	....	....	....	....	....	......	......	......	....	......	1	......	1	....	......	....	......
....	2	4	....	4	12	27	12	11	1	6	19	30	22	13	13	21	17
....	....	....	....	....	....	......	......	......	....	......	....	......	2	....	......	....	......

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
LAKE ONTARIO AND WESTERN DIST.—(*Con.*)										
Newark	4,578	6	......	0	......	4	......	....	....	....
Lyons	5,884	7	......	2	28.6	1	......	....	....	....
Clyde	2,507	2	......	0	......	0	500	....	....	....
OSWEGO	22,200	31	16.4	4	12.9	12	161	....	2	....
FULTON	8,734	9	......	0	......	8	111	....	1	....
Richland	3,535	2	......	0	......	2	......	....	....	....
Rest of District	244,184	288	14.0	50	17.4	97	80	....	1	....
Total for the State	7,910,000	11,134	16.7	3,872	34.8	1,624	283	31	126	10
Average for past 5 years	....	11,522	19.2	4,594	40.0	1,636	242	56	98	24

FOR JULY—(*Concluded*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	......	......	1	....	......	....	......	4	....	......	....	1
....	....	....	....	....	....	......	1	......	....	......	....	2	1	....	2	....	1
....	1	....	....	....	....	......	......	......	....	......	....	......	1	....	......	....	......
....	....	....	....	1	....	2	2	1	....	......	1	9	6	2	2	2	1
....	....	....	....	....	....	......	......	1	1	......	....	1	1	....	1	1	2
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	2	......
....	1	2	....	1	5	18	17	23	5	16	20	50	43	15	24	21	31
....	89	88	14	72	234	1,815	846	991	94	627	808	1,058	1,054	468	900	871	1,449
25	66	72	19	116	173	2,144	708	1,061	75	1,078	780	818	1,060	415	1,006	898	1,375

MONTHLY BULLETIN OF THE NEW YORK STATE

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS.

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
MARITIME DISTRICT										
Totals....................	4,052,875	5,932	17.3	2,470	41.5	484	260	27	76	7
CITY OF NEW YORK										
Totals....................	3,732,903	5,452	17.2	2,307	42.5	393	265	26	70	7
BOROUGH OF MANHATTAN..	1,917,676	2,931	18.0	1,237	41.0	183	250	18	33	1
BOROUGH OF THE BRONX...	268,341	372	16.4	133	36.0	37	210	1	6	1
BOROUGH OF BROOKLYN....	1,219,597	1,776	16.2	748	42.3	150	275	7	25	3
BOROUGH OF QUEENS........	182,681	256	16.8	135	52.0	10	340	....	4	2
BOROUGH OF RICHMOND....	72,608	117	19.0	54	50.0	13	320	....	2	....
Oyster Bay..................	16,334	5	......	2	40.0	1	200	....	....	....
Hempstead	27,066	24	12.0	10	40.0	5	125	....	....	....
North Hempstead...........	12,048	17	......	9	52.0	1	200	....	....	....
Southold	8,301	5	......	1	20.0	3	200	....	1	....
Sag Harbor..................	3,500	4	......	2	50.0	1	250	....	....	....
Huntington...................	9,483	29	......	7	25.0	10	235	....	1	....
Brookhaven	14,592	22	......	2	9.0	13	135	....	1	....
YONKERS	50,000	68	16.0	36	53.0	6	265	....	....	....
Greenburgh	15,564	12	......	5	41.5	2	333	....	....	....
MOUNT VERNON	20,346	24	14.0	5	28.0	8	280	....	1	....
Port Chester................	7,440	29	......	15	51.0	2	335	....	....	....
Ossining	7,939	9	......	2	22.2	1	111	....	....	....
NEW ROCHELLE	14,720	23	......	8	35.0	3	175	....	....	....
Peekskill....................	10,358	17	......	9	53.0	3	510	....	....	....
White Plains...............	7,900	18	......	8	44.4	1	500	....	....	....
Rest of District.............	94,382	174	21.7	42	24.3	31	120	1	2	....
HUDSON VALLEY DIST.										
Totals....................	696,000	950	16.0	238	25.0	189	120	3	13	....
ALBANY.......................	100,000	148	17.5	39	26.3	18	60	....	3	....
COHOES	24,000	26	12.7	9	35.0	2	268	....	1	....
TROY	75,057	104	16.3	29	28.0	17	118	....	....	....
WATERVLIET	14,321	15	......	5	33.3	0	66	....	....	....
Green Island	4,770	4	......	0	......	1	......	....	....	....
Hoosick Falls...............	5,671	11	......	1	9.0	4	90	....	....	....
RENSSELAER................	7,466	11	......	3	38.2	3	......	....	....	....
Coxsackie	4,102	9	......	4	44.4	2	111	....	....	....
Catskill	5,486	14	......	8	57.0	2	......	....	....	....
HUDSON	9,528	14	......	3	21.5	5	142	....	....	....
KINGSTON....................	24,535	32	15.4	11	34.5	4	155	....	....	....
Ellenville	3,000	4	......	3	75.0	0	250	....	....	....
Marbletown..................	3,511	3	......	0	......	0	......	....	....	....
Rosendale	6,278	1	......	0	......	0	......	....	....	....
Esopus	4,907	7	......	3	50.0	0	166	....	....	....
Saugerties.	3,700	4	......	0	......	0	......	....	....	....
POUGHKEEPSIE	24,029	24	12.0	3	12.5	11	125	....	....	....
Fishkill	13,016	27	......	7	26.0	3	175	....	1	....
Wappingers Falls...........	3,504	13	......	6	48.0	2	300	....	....	....
NEWBURG....................	25,000	45	21.0	13	30.0	5	200	....	2	....
Port Jervis	9,385	14	......	1	7.0	3	215	....	....	....
MIDDLETOWN	14,522	16	14.0	2	12.5	3	60	1	....	....
Warwick	6,403	7	......	0	......	3	285	1	....	....
Goshen	4,564	8	......	2	25.0	4	250	....	....	....
Montgomery..................	5,939	4	......	3	75.0	0	500	....	....	....
Haverstraw..................	9,874	11	......	3	22.2	1	......	....	....	....
Nyack	4,275	10	......	3	30.0	2	100	....	....	....
Ramapo.......................	7,502	12	......	2	16.6	3	......	....	....	....
Rest of District.............	271,800	352	15.6	75	21.5	91	115	1	6	....

DEPARTMENT OF HEALTH — VOLUME XIX

districts, cities, villages and towns during August, 1903

villages in *italic* and towns in Roman type.]

	ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
	Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	31	27	9	42	113	1,208	372	676	48	288	403	442	399	241	362	65	1,096
....	....	30	25	9	40	111	1,123	354	626	42	234	383	393	331	227	333	50	1,038
....	....	4	13	7	17	59	590	178	315	19	114	210	235	171	122	178	24	622
....	....	9			5	7	49	23	91	4	9	16	17	19	18	28	1	68
....	....	15	11	2	15	41	378	123	195	18	94	135	119	112	73	102	20	289
....	....	1	1		3	3	72	24	16	1	15	15	14	23	8	15	4	35
....	....	1				1	84	6	9		2	7	8	6	6	10	1	24
....	....						1						2	1				1
....	....	1					2				2	3	3	7	1	1	1	3
....	....					1	3		1		2		1	2	1	2		4
....	....											1		3				
....	....						1							1			1	1
....	....				1		4	2	3	1	2	1	1	4	2		1	5
....	....						2		2		4		2	3	1	2	4	2
....	....					1	17	5	8	1	8	1	4	5	1	6		11
....	....						4				1	1	2	3		1		
....	....				1		3	2	3	1	5	2		4		1	1	
....	....						10	1	3		2	1	3			3	1	5
....	....						1				1		2	3		2		
....	....						4	1	3		4		4	1		4		2
....	....		2				6	1			2	1	1	1		1		2
....	....						9		2		1		1	2	1	2		
....	....						18	6	25	3	20	9	23	28	7	4	6	22
....	....	6	5	1	5	9	71	35	98	4	110	73	111	118	38	80	45	125
....	....					1	5	8	16	1	25	17	22	6	8	7	3	26
....	....	2	1				3	1	4		2	1	1	1	1	2	1	5
....	....	1				2	9		10		12	7	14	17	4	5	6	17
....	....					1		2	4				1	1	1	1		4
....	....								1			1	1					1
....	....						1	3			1		3	1	1		1	
....	....							1	1			1		3		1	1	3
....	....						1				1	1	2	2			1	1
....	....										2	1	1			2	1	7
....	....				1	1			2		1	1	2	5	1			
....	....	3					3	2	3		3	3	5	3	1	1		5
....	....						1	1	1									1
....	....								2							1		
....	....													1				
....	....					1		1	1		1	1		1				1
....	....								1			2			1			
....	....						3		2		4	1	2	5	1	1	3	2
....	....						4		1		2	3	5	4		5	2	
....	....		1				3		3	1	2	1		1				1
....	....						7	2	8		2	6	4	6	1	3	2	2
....	....				2		1		1		1	1	1			4	1	2
....	....							1	2		1		2	3	1	2	1	2
....	....					1					1		1		1			2
....	....						2				2			1			1	2
....	....					1	1									1		1
....	....								4		2			1	1		1	2
....	....						1		3		2			1	1			2
....	....								3		1	2		1		1		4
....	....		3	1	2	1	26	13	25	2	42	23	44	54	14	43	20	32

MONTHLY BULLETIN

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
ADIRONDACK AND NORTHERN DISTRICT Totals	394,772	428	13.0	96	22.5	115	150	3	4	....
WATERTOWN	21,700	39	21.0	15	38.0	9	350	....	2	....
Ellisburgh	3,888	4	......	1	25.0	2	......	....	....	....
Cape Vincent	2,882	1	......	0	......	0	......	....	....	....
Clayton	4,818	4	......	0	......	1	......	....	....	....
OGDENSBURG	12,633	21	......	5	24.8	3	300	2	....	....
Gouverneur	6,000	3	......	1	33.3	0	......	....	....	....
Potsdam	3,843	3	......	1	33.3	0	333	....	....	....
Canton	6,387	5	......	3	60.0	1	200	....	....	....
Malone	5,965	9	......	5	55.5	2	111	....	....	....
Plattsburg	8,434	15	......	6	40.0	3	200	....	....	....
Glens Falls	12,613	16	15.0	4	25.0	4	250	....	....	....
Whitehall	4,877	8	......	1	12.5	1	......	....	....	....
Fort Edward	5,216	7	......	1	14.2	4	142	....	....	....
Sandy Hill	4,478	3	......	1	33.3	1	......	....	....	....
Granville	5,217	2	......	1	50.0	1	500	....	....	....
Greenwich	4,172	4	......	0	......	1	......	....	....	....
Lowville	3,746	2	......	0	......	0	......	....	....	....
Rest of District	279,000	282	12.0	51	18.0	82	125	1	2	....
MOHAWK VALLEY DIST. Totals	420,000	598	16.8	170	28.0	129	205	3	10	....
SCHENECTADY	47,625	70	17.0	29	42.0	6	400	....	3	....
Cobleskill	3,978	5	......	2	40.0	1	400	....	....	....
AMSTERDAM	20,929	36	20.1	16	44.4	4	275	....	3	....
Fort Plain	2,444	3	......	0	......	1	......	....	....	....
JOHNSTOWN	10,130	15	......	1	7.0	4	135	....	....	....
GLOVERSVILLE	18,349	26	18.0	11	42.5	5	380	....	....	....
LITTLE FALLS	10,361	27	......	7	26.0	6	240	....	1	....
Herkimer	5,555	6	......	4	66.6	0	666	....	....	....
Ilion	5,138	7	......	5	71.0	1	428	2	....	....
UTICA	56,383	118	21.0	38	33.5	23	210	....	....	....
Whitestown	6,235	7	......	2	28.5	2	142	....	....	....
ROME	15,343	14	......	1	7.0	5	70	....	....	....
Boonville	3,332	4	......	0	......	3	......	....	....	....
Camden	3,745	......	......	......	......	......	......	....	....	....
Waterford	6,157	10	......	2	20.0	3	......	....	....	....
Mechanicville	4,695	6	......	3	50.0	1	500	....	....	....
Ballston Spa	3,923	6	......	1	16.6	1	166	....	....	....
Saratoga Springs	12,409	33	......	4	12.0	3	120	....	1	....
Rest of District	183,250	211	13.2	44	20.0	60	135	1	2	....
SOUTHERN TIER DISTRICT Totals	429,580	497	14.0	104	21.0	133	150	3	9	....
BINGHAMTON	39,647	57	16.7	13	23.0	8	70	....	....	....
Owego	5,039	6	......	1	16.6	2	166	....	....	....
Candor	3,310	5	......	1	20.0	1	......	....	....	....
Waverly	4,465	5	......	1	20.0	1	......	....	....	....
ELMIRA	35,672	38	13.0	12	31.5	7	400	....	4	....
Horseheads	4,944	12	......	4	33.3	1	415	....	2	....
HORNELLSVILLE	12,000	19	......	8	42.0	1	325	....	1	....
Bath	5,000	5	......	0	......	1	......	....	....	....
CORNING	11,061	9	......	2	22.2	0	222	1	....	....
Wellsville	5,000	4	......	0	......	2	......	....	....	....
OLEAN	9,462	9	......	2	22.2	0	111	....	....	....
Salamanca	4,251	7	......	1	14.2	1	142	....	....	....
DUNKIRK	11,616	25	......	10	40.0	4	400	....	....	....

FOR AUGUST—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	1	....	....	2	2	55	13	35	7	44	31	47	49	16	27	37	55
....	....	....	....	....	....	11	....	2	....	4	2	4	4	1	1	3	5
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	2	1
....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....
....	....	....	....	....	....	....	....	1	....	1	1	....	....	....	....	1	....
....	1	....	....	....	....	3	....	2	....	2	....	2	....	1	4	2	2
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	1
....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	1	....	....
....	....	....	....	....	....	1	....	....	....	....	....	1	1	....	....	....	2
....	....	....	....	1	....	....	....	2	....	1	1	....	1	....	....	1	2
....	....	....	....	....	....	3	....	1	....	3	2	1	2	....	....	1	2
....	....	....	....	....	....	4	....	2	....	1	....	2	2	....	2	....	3
....	....	....	....	....	....	....	....	....	1	1	....	1	1	....	2	1	1
....	....	....	....	1	....	....	....	....	....	1	....	1	1	1	....	2	....
....	....	....	....	....	....	....	....	....	....	2	....	1	....	....	....	....	....
....	....	....	....	....	....	1	....	....	....	....	1	....	....	....	....	....	....
....	....	....	....	....	....	....	....	1	....	1	....	1	1	....	....	....	....
....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....
....	....	....	....	....	2	31	12	24	6	26	24	32	34	12	16	24	36
....	2	1	2	12	5	88	25	41	6	59	43	64	65	29	32	37	74
....	1	1	....	1	1	20	2	6	....	6	4	7	1	....	5	4	8
....	....	....	....	....	....	2	....	1	....	....	....	....	2	....	....	....	....
....	....	....	....	....	1	6	3	2	1	2	....	3	2	2	....	2	9
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1
....	....	....	....	....	....	2	....	3	....	....	1	....	1	3	....	3	2
....	....	....	....	1	....	8	....	....	1	2	4	1	2	1	1	1	4
....	....	....	1	3	....	1	....	2	1	4	....	5	3	3	....	1	2
....	....	....	....	2	....	2	....	....	....	1	....	1	....	....	....	....	....
....	....	....	....	1	....	....	....	....	....	2	....	1	....	1	....	....	....
....	....	....	1	2	1	18	7	10	....	12	7	8	18	3	6	3	17
....	....	....	....	....	....	1	....	1	....	....	....	1	....	....	2	1	1
....	....	....	....	....	....	1	1	....	....	....	....	3	2	2	1	2	2
....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	3	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	2	....	1	1	3	2	....	....	1	....
....	....	....	....	....	1	2	1	....	....	1	1	....	....	....	....	....	....
....	....	....	....	....	....	1	....	....	....	....	....	2	1	....	....	....	2
....	....	....	....	....	....	3	3	2	1	5	4	5	4	....	1	1	3
....	1	....	....	2	1	21	8	11	2	23	21	24	27	14	16	14	23
....	2	1	....	4	1	54	18	33	1	50	25	63	65	33	30	33	57
....	....	....	....	1	....	3	....	6	....	3	2	3	3	3	1	4	13
....	....	....	....	....	....	1	....	....	....	....	....	1	2	....	....	2	....
....	....	....	....	....	....	....	....	....	....	....	1	1	1	....	1	....	1
....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	1	2
....	....	....	....	....	....	11	....	....	....	4	6	5	2	1	1	....	4
....	....	....	....	....	....	3	....	2	....	2	....	1	1	1	....	....	....
....	....	....	....	1	....	4	....	2	....	3	....	....	4	2	1	....	2
....	....	....	....	....	....	....	....	1	....	1	....	1	2	....	....	....	....
....	....	....	....	1	....	....	....	....	....	1	1	....	1	1	1	....	2
....	....	....	....	....	....	....	....	....	....	1	....	....	2	....	....	....	1
....	....	....	....	....	....	1	....	....	....	4	....	....	1	....	1	....	2
....	....	....	....	....	....	1	1	1	....	....	....	1	....	1	....	1	1
....	2	....	....	1	....	7	1	1	....	1	1	1	2	1	4	2	1

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
SOUTHERN TIER DISTRICT —(*Continued*)										
JAMESTOWN	22,892	21	12.0	6	28.5	7	185	....	....	....
Westfield	2,430	5	......	2	40.0	0	200	1	....	....
Fredonia	4,125	12	......	6	50.0	2	500	....	....	....
Rest of District	248,600	258	12.5	35	14.0	95	75	1	2	....
EAST CENTRAL DISTRICT Totals	408,000	479	14.0	112	23.4	120	185	1	1	....
SYRACUSE	108,374	141	15.5	58	41.2	16	200	....	....	....
Baldwinsville	3,000	1	......	0	......	0	......	....	....	....
DeWitt	5,435	4	......	1	25.0	2	250	....	....	....
CORTLAND	9,014	12	......	3	25.0	2	166	....	....	....
Homer	2,381	3	......	0	......	2	......	....	....	....
ONEIDA	7,942	15	......	5	33.3	2	266	....	....	....
Hamilton	3,744	6	......	0	......	2	......	....	....	....
Cazenovia	3,380	6	......	0	......	3	......	....	....	....
Canastota	3,300	3	......	1	33.3	1	......	....	....	....
Norwich	5,766	11	......	1	......	4	......	....	....	....
Oneonta	7,147	9	......	3	33.3	3	111	....	....	....
Worcester	2,409	1	......	0	......	1	......	....	....	....
Cooperstown	2,368	8	......	2	25.0	1	......	....	....	....
Walton	4,369	1	......	0	......	1	......	....	....	....
Delhi	3,243	......	......	......	......	......	......	....	....	....
Liberty	4,568	12	......	0	......	0	......	....	....	....
Rest of District	225,540	247	13.0	38	15.3	80	100	1	1	....
WEST CENTRAL DISTRICT Totals	330,600	373	13.6	75	20.0	120	150	1	4	....
AUBURN	35,000	52	17.8	17	31.0	6	300	....	....	....
ITHACA	13,136	21	......	8	38.0	3	333	....	2	....
Hector	4,137	2	......	0	......	0	......	....	....	....
Waterloo	4,256	5	......	0	......	3	......	....	....	....
Seneca Falls	6,519	12	......	3	25.0	4	166	....	....	....
GENEVA	10,433	11	......	3	27.3	2	90	....	....	....
Canandaigua	6,151	15	......	4	26.6	2	200	1	....	....
Manchester	4,733	8	......	3	37.5	1	375	....	1	....
Phelps	4,788	3	......	1	33.3	0	......	....	....	....
Penn Yan	4,650	7	......	1	14.2	2	142	....	....	....
Batavia	9,180	8	......	4	50 0	3	375	....	....	....
Dansville	3,633	8	......	1	12.5	5	......	....	....	....
LeRoy	3,144	2	......	0	......	2	......	....	....	....
Warsaw	4,341	2	......	0	......	1	......	....	....	....
Rest of District	206,500	216	12.2	30	14.0	81	93	....	1	....
LAKE ONTARIO AND WESTERN DISTRICT Totals	893,819	1,179	15.5	389	33.0	222	225	5	24	....
BUFFALO	370,000	538	17.4	213	40.0	68	270	4	9	....
TONAWANDA	7,421	12	......	3	25.0	3	80	....	1	....
Amherst	4,223	2	......	0	......	1	......	....	....	....
NORTH TONAWANDA	9,069	5	......	2	40.0	0	200	....	....	....
LOCKPORT	16,581	35	......	11	31.0	6	300	....	4	....
NIAGARA FALLS	19,457	22	13.2	14	63.5	0	375	....	2	....
Medina	4,716	3	......	0	......	1	......	....	....	....
Albion	4,477	6	......	1	16.6	2	......	....	....	....
Brockport	3,400	5	......	0	......	2	......	....	....	....
ROCHESTER	162,608	210	15.2	54	25.8	51	180	....	3	....
Palmyra	3,758	4	......	1	25.0	2	250	....	....	....

FOR AUGUST—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	1	....	....	1	2	......	8	....	......	1	6	1	2	1	1	2
....	....	....	....	....	....	......	......	1	....	......	....	......	......	....	......	....	8
....	....	....	....	....	....	6	......	1	....	......	1	1	1	....	1	....	1
....	....	....	....	....	....	15	11	20	1	31	12	41	37	20	18	27	22
....	....	1	2	8	8	54	18	34	6	44	42	69	67	27	31	27	54
....	....	....	....	....	1	28	4	8	1	14	18	6	15	9	8	9	25
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	1
....	....	....	....	....	....	1	......	......	....	2	1	......	......	....	......	....	......
....	....	....	....	....	....	2	1	......	....	8	1	1	......	1	......	1	2
....	....	....	....	....	....	......	......	......	....	......	....	......	......	1	......	1	......
....	....	....	....	....	....	4	......	1	....	1	2	1	4	....	1	....	1
....	....	....	....	....	....	......	......	......	....	1	....	8	1	....	1	....	......
....	....	....	....	....	....	......	......	......	....	......	....	8	1	1	......	1	......
....	....	....	....	....	....	......	......	......	....	......	....	......	1	....	......	1	1
....	....	....	1	1	....	1	......	1	....	......	1	1	2	1	1	1	......
....	....	....	....	....	....	1	......	......	....	......	1	......	1	....	1	2	3
....	....	....	....	....	....	......	......	......	....	......	....	......	1	....	......	....	......
....	....	....	....	....	....	......	1	......	....	1	1	1	......	....	2	....	2
....	....	....	....	....	....	......	......	......	....	......	....	......	1	....	......	....	......
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	......
....	....	....	....	....	....	......	1	10	....	......	....	......	......	....	1	....	......
....	....	1	1	2	2	17	6	14	5	22	22	53	40	14	16	11	19
....	....	1	1	....	2	47	17	30	1	26	23	62	58	21	21	16	41
....	....	....	1	....	....	15	2	4	....	5	2	8	4	5	2	2	2
....	....	....	....	....	....	5	......	1	....	2	4	2	2	....	......	1	2
....	....	....	....	....	....	......	......	1	....	1	....	......	......	....	......	....	......
....	....	....	....	....	....	......	......	......	....	1	....	......	1	....	1	....	2
....	....	....	....	....	....	2	......	......	....	......	....	6	1	2	......	....	1
....	....	....	....	....	....	1	1	1	....	......	....	3	3	....	1	....	1
....	....	....	....	....	....	2	1	1	....	2	1	......	2	1	1	....	3
....	....	....	....	....	....	2	......	1	....	1	....	......	2	....	......	1	......
....	....	....	....	....	....	......	......	1	....	......	....	1	......	....	......	....	1
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....	....	....	....	....	....	8	......	......	....	......	....	1	2	1	1	....	......
....	....	....	....	....	....	......	......	......	....	......	....	2	3	1	......	....	2
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....	....	....	....	....	....	......	......	......	....	......	....	1	1	....	......	....	......
....	....	1	....	....	2	16	18	19	1	14	16	37	32	11	14	12	27
....	8	18	5	14	22	178	55	78	9	116	69	113	138	60	100	60	122
....	8	18	4	4	15	92	84	87	5	59	27	88	51	26	46	15	56
....	....	....	....	....	....	......	......	......	....	1	2	3	......	1	3	....	2
....	....	....	....	....	....	......	......	......	....	......	....	......	1	....	......	1	......
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....	....	....	....	....	....	6	......	1	....	5	4	7	2	1	1	8	1
....	....	....	....	1	....	5	......	......	....	8	....	1	......	2	2	....	6
....	....	....	....	....	....	......	......	......	....	......	....	1	......	1	1	....	......
....	....	....	....	....	....	......	1	......	....	......	....	......	......	1	2	2	......
....	....	....	....	....	....	......	2	......	....	......	1	2	......	....	......	....	......
....	1	....	1	8	5	25	10	17	....	20	18	22	28	12	10	15	20
....	1	....	....	....	....	......	......	......	....	......	1	......	2	....	......	....	......

MONTHLY BULLETIN

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
LAKE ONTARIO AND WESTERN DIST.—(*Con.*)										
Newark	4,578	2	......	0	......	1	......	....	....	....
Lyons	5,824	8	......	0	......	5	125	....	....	....
Clyde	2,507	8	......	0	......	1	125	....	....	....
OSWEGO	22,200	23	12.5	11	48.5	3	435	....	2	....
FULTON	8,734	5	......	1	20.0	0	200	....	....	....
Richland	3,535	5	......	0	......	0	......	....	....	....
Rest of District	244,184	286	14.0	78	27.5	82	168	1	8	....
Total for the State	7,910,000	10,435	16.0	3,654	35.0	1,512	220	46	141	7
Average for past 5 years	....	10,800	18.0	4,220	39.1	1,446	250	47	167	33

REMARKS—The mean highest range of the barometer was on the 2nd and lowest ranges came during the last week. The rainfall was everywhere excessive, in contrast with July in which month there was general deficiency. There were from 11 to 20 days at the various stations on which there was precipitation, the number of rainy days being largest in the eastern part of the State. The days of greatest general rainfall were the 4th and 5th of the early part of the month and the 25th and during the last week. The temperature was everywhere below the normal, the mean being from 4 to 6 degrees under the average; lowest temperature occurred during the first week and highest toward the end of the month. The weather showed greater equability in the western part of the State.

THE CONFERENCE OF SANITARY OFFICERS—During the past two years there have been held in Albany, under the direction of the State Department of Health, in the month of October gatherings of the health officers and members of the local boards of health throughout the State for the purpose of conference on various subjects of practical interest to them, and for the presentation of papers on topics pertaining to their work by men capable of giving instruction of value and importance. These papers together with the opportunity afforded of inquiry and discussion have given an educational value to the gathering which it would be impossible to secure in any other manner in so compact a way and so short a time. The legal questions of the powers and obligations of health officers and boards of health, the questions of nuisances and their abatement, the jurisdiction of health authorities regarding many questions which are brought before them in their work, have furnished a broad subject which has attracted the unflagging interest of the meetings; subjects relating to the technical work of the health officers; other subjects of instruction to the clerks and registration officers; disinfection and the best means for effecting it; public schools and school children in their relation to health in various directions; foods and adulteration of them; sewage disposal and the protection of streams from pollution, have been some of the very practical subjects which have been taken up for consideration. The institutions connected with the work of the Department—the bacteriological and serum laboratories—have been seen and their working shown. The value of these conferences has been shown by the considerable attendance from all parts of the State and by the interest shown by all who have come in the meetings. They have been of much service to the Department not only in giving information at first hand on matters of daily correspondence, but in the opportunity of forming personal acquaintance with the local officers and board members. They improve the local health service and bind the health workers of the State more closely in their common interests. The Legislature has recognized the importance of the conference by a recent amendment to the Public Health Law, which makes provision authorizing the local boards of health to allow and provide for the reasonable expenses of their health officers in attending this meeting.

The Annual Sanitary Conference has come to be an established institution and part of the work of the State Department of Health. The third conference will be held in Albany on the 8th and 9th of October. It will be held in the Assembly Chamber of the Capitol, and will doubtless be largely attended. Invitations to it have been sent to all local boards of health, all the health officers of which and registrars as well as members are invited to attend it.

Arrangements have been made for a rebate in the cost of railroad transportation. When purchasing a ticket to Albany at the *starting point* or nearest station

FOR AUGUST—(*Concluded*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH											
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	1	1
....	....	....	....	....	....	1	......	1	1	......	....	......	2	....	1	2	......
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....	....	....	....	4	....	5	......	2	....	2	1	2	8	1	......	1	......
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....	....	....	....	....	....	......	......	1	....	......	....	1	2	....	1	....	......
....	8	....	....	2	2	86	7	14	8	24	14	86	45	14	29	20	88
....	50	49	20	82	157	1,750	548	1,025	82	787	709	976	959	470	688	825	1,624
10	82	39	13	113	160	2,102	598	1,088	78	985	674	791	1,000	415	696	898	1,424

issuing them, a *certificate* should be asked for from the ticket agent; this is to be presented at the meeting, where it will be endorsed by an officer of the Trunk Line Association, and will entitle the holder to return at one-third fare.

The Conference will be opened by an afternoon session on October 8th, and this will be followed by an evening session. On the next day there will be a morning and an evening session, the afternoon of this day being utilized by a visit to the filtration plant of the city of Albany, where the drinking water of the city is filtered, and which has attracted attention as a modern construction of this sort that has proved exceedingly efficient in removing pathogenic bacteria. A paper on the subject of water purification, by the engineer who planned this plant, will follow in the evening. Other subjects not heretofore brought before the conferences will be presented at the meeting.

The following is the complete program of the conference:

October 8th, 2.30 p. m.

1. Comments Upon the Recent Amendments of the Public Health Laws. Hon. Sanford T. Church, Deputy Attorney-General.
2. Food Adulteration, its Nature and Extent. Professor Willis G. Tucker, Director of the Bureau of Chemistry, New York State Department of Health.
3. School Sanitation. Professor O. H. Landreth, Consulting Engineer, New York State Department of Health; Dean of Engineering School, Union University. (Hon. D. E. Ainsworth, Deputy Superintendent of Public Instruction, is expected to discuss this paper.)
4. Care of the Eyes of School Children. Dr. P. A. Callan, Attending Ophthalmic Surgeon, New York Eye Infirmary.

October 8th, 8 p. m.

1. The Management of Epidemics of Contagious and Infectious Diseases. Dr. J. D. Fulton, of Baltimore, Secretary of the Maryland State Board of Health.
2. The Serum Treatment of Tetanus. Dr. Herbert D. Pease, Director of the Antitoxin Laboratory of the New York State Department of Health.

October 9th, 9.30 a. m.

1. Management of Typhoid Fever Epidemics. George A. Soper, Ph. D., Representative of the State Department of Health at Ithaca.
2. Prophylaxis of Pulmonary Tuberculosis. Dr. William A. Evans, of Chicago, President of the Cook County Medical Society. To be discussed by Dr. Samuel B. Ward and Dr. Frederick C. Curtis.
3. The New York State Hospital for Tuberculosis. Dr. Willis G. MacDonald.
4. Suggestions to Registrars of Local Boards of Health. T. A. Stuart, Chief Clerk of the State Department of Health.

October 9th, 2 p. m.

Arrangements have been made for the Delegates to visit the Filter Plant of the City of Albany.

Evening Session at 8 p. m.

1. The Protection of the Milk Supply of Cities. Dr. Ernest J. Lederle, President of the New York City Board of Health.
2. Water Purification. Mr. Allen Hazen, C. E., of New York City.
3. Practical Questions in the Destruction of Mosquitoes. Dr. A. H. Doty, Health Officer of the Port of New York.

MONTHLY BULLETIN OF THE NEW YORK STATE

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS.

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
MARITIME DISTRICT										
Totals	4,052,875	5,406	16.8	1,969	36.5	478	200	15	79	14
CITY OF NEW YORK										
Totals	3,732,903	4,948	16.1	1,844	37.2	393	200	15	74	10
BOROUGH OF MANHATTAN	1,917,676	2,696	17.0	1,070	40.0	158	207	12	38	2
BOROUGH OF THE BRONX	268,341	321	14.5	73	22.8	32	140	....	5	....
BOROUGH OF BROOKLYN	1,219,597	1,621	15.3	607	37.4	173	209	3	29	5
BOROUGH OF QUEENS	182,681	221	14.5	72	32.5	15	200	....	1	3
BOROUGH OF RICHMOND	72,608	89	15.0	22	25.0	15	185	....	1	....
Oyster Bay	16,334	......	......	......	......	......	......	....	....	....
Hempstead	27,066	38	17.0	15	40.0	4	300	....	....	....
North Hempstead	12,048	29	......	5	17.2	5	70	....	....	....
Southold	8,301	5	......	1	20.0	8	......	....	....	....
Sag Harbor	3,500	4	......	3	75.0	0	......	....	....	....
Huntington	9,483	21	......	7	33.3	7	333	....	....	....
Brookhaven	14,592	24	......	6	25.0	6	165	....	1	....
YONKERS	50,000	76	18.5	27	35.5	14	195	....	2	2
Greenburgh	15,564	12	......	3	25.0	2	165	....	....	....
MOUNT VERNON	20,346	22	13.2	7	35.0	4	50	....	1	....
Port Chester	7,440	9	......	4	44.4	0	333	....	....	....
Ossining	7,939	12	......	2	16.6	1	85	....	....	....
NEW ROCHELLE	14,720	21	16.5	9	44.0	4	142	....	....	1
Peekskill	10,358	14	......	7	50.0	2	285	....	....	....
White Plains	7,900	11	......	3	27.3	2	......	....	....	....
Rest of District	94,382	162	21.0	26	16.5	26	125	....	1	1
HUDSON VALLEY DIST.										
Totals	696,000	877	15.5	195	22.3	178	110	....	17	1
ALBANY	100,000	139	17.0	24	17.0	26	70	....	1	....
COHOES	24,000	39	20.0	14	36.0	4	250	....	....	....
TROY	75,057	104	16.8	23	22.5	18	70	....	1	....
WATERVLIET	14,321	19	......	4	21.0	1	50	....	....	....
Green Island	4,770	7	......	0	......	3	......	....	....	....
Hoosick Falls	5,671	10	......	2	20.0	2	200	....	....	....
RENSSELAER	7,466	13	......	4	33.0	1	80	....	....	....
Coxsackie	4,102	7	......	3	42.8	3	428	....	....	....
Catskill	5,486	8	......	3	37.5	1	250	....	....	....
HUDSON	9,528	10	......	3	30.0	0	100	....	1	....
KINGSTON	24,535	40	19.8	14	35.0	4	175	....	....	....
Ellenville	3,000	1	......	0	......	1	......	....	....	....
Marbletown	3,511	......	......	......	......	......	......	....	....	....
Rosendale	6,278	2	......	1	50.0	0	500	....	....	....
Esopus	4,907	4	......	1	25.0	2	250	....	....	....
Saugerties	3,700	7	......	3	42.8	2	285	....	....	....
POUGHKEEPSIE	24,029	37	19.2	5	13.5	4	160	....	1	1
Fishkill	13,016	15	......	5	33.3	3	111	....	....	....
Wappingers Falls	3,504	5	......	2	40.0	1	200	....	....	....
NEWBURG	25,000	28	13.7	7	25.0	1	175	....	3	....
Port Jervis	9,385	14	......	6	42.8	0	142	....	1	....
MIDDLETOWN	14,522	20	17.0	4	20.0	3	50	....	1	....
Warwick	6,403	11	......	2	18.2	0	182	....	....	....
Goshen	4,564	8	......	1	12.5	3	250	....	1	....
Montgomery	5,939	8	......	1	12.5	2	125	....	....	....
Haverstraw	9,874	5	......	0	......	1	......	....	....	....
Nyack	4,275	4	......	0	......	2	......	....	....	....
Ramapo	7,502	9	......	3	33.3	0	......	....	....	....
Rest of District	271,800	303	14.0	60	20.0	90	126	....	7	....

DEPARTMENT OF HEALTH—VOLUME XIX

districts, cities, villages and towns during September, 1903

villages in *italic* and towns in Roman type.]

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	24	15	6	30	123	762	585	616	39	261	429	422	420	207	399	76	936
....	23	14	6	27	118	712	514	564	36	237	396	372	355	186	360	58	871
....	8	9	5	19	62	411	296	287	18	188	194	209	172	114	211	22	479
....	7	....	....	1	5	27	25	92	2	9	21	18	27	10	15	5	52
....	18	5	1	7	44	227	174	156	10	81	159	111	125	49	99	27	296
....	....	....	....	....	7	32	17	21	5	12	18	23	23	9	22	3	30
....	....	....	....	....	....	15	2	8	1	2	9	11	8	4	13	1	14
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	......
....	....	....	....	....	2	8	2	4	....	3	3	5	3	....	2	2	5
....	....	....	....	....	....	2	1	2	1	2	2	4	4	1	3	3	4
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....	....	....	....	....	....	......	1	1	....	......	....	......	......	....	......	....	2
....	....	....	....	....	1	2	2	......	....	......	2	......	5	2	......	2	3
....	....	....	....	1	....	2	1	......	....	......	1	4	2	1	7	2	2
....	1	....	....	....	....	10	2	13	1	1	5	6	12	4	2	....	15
....	....	....	....	....	....	2	......	1	....	......	....	3	......	3	2	1	......
....	....	....	....	....	....	......	......	3	....	1	2	2	1	2	3	....	7
....	....	....	....	....	....	3	......	......	....	3	....	......	1	....	2	....	......
....	....	....	....	....	....	1	1	1	....	......	1	3	1	1	2	....	1
....	....	....	....	....	....	2	1	1	....	3	1	3	3	....	......	2	4
....	....	1	....	....	....	3	......	......	....	1	1	1	......	....	2	1	4
....	....	....	....	....	....	......	1	......	....	1	1	1	4	....	1	....	2
....	....	....	....	2	2	15	9	26	1	8	14	18	29	7	13	4	12
....	5	....	2	3	13	61	63	91	6	62	76	122	110	61	49	85	100
....	2	....	....	....	1	1	12	20	....	9	12	37	8	12	4	5	15
....	2	....	....	....	1	7	5	3	....	3	2	2	4	1	2	....	7
....	....	....	....	....	....	6	6	12	....	10	18	11	19	10	3	1	13
....	....	....	....	....	1	......	3	3	1	1	....	3	2	2	......	....	3
....	....	....	....	....	....	......	......	......	....	1	2	2	......	....	2	....	......
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....	....	....	....	1	....	2	......	1	....	1	....	......	1	....	......	....	1
....	....	....	....	....	....	2	2	1	....	1	....	......	......	1	......	....	1
....	....	....	....	....	....	......	1	1	....	......	1	2	......	1	......	....	3
....	1	....	....	....	2	4	1	5	2	3	2	4	3	2	4	1	6
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....	....	....	....	....	1	3	1	6	....	3	3	4	5	3	2	1	3
....	....	....	1	....	....	1	1	1	....	2	....	2	5	....	......	....	2
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....	....	....	....	....	....	2	6	2	1	2	2	......	2	1	3	1	3
....	....	....	....	....	1	......	1	1	....	1	1	......	......	....	3	....	5
....	....	....	....	....	....	......	2	2	....	1	2	3	5	1	......	1	2
....	....	....	....	....	....	1	......	......	....	......	1	3	1	2	1	....	2
....	....	....	....	....	....	1	2	1	....	......	....	1	2	....	......	....	......
....	....	....	....	....	....	1	......	......	....	2	1	1	......	....	1	1	1
....	....	....	....	....	....	......	......	......	....	1	2	1	......	1	......	....	......
....	....	....	....	....	....	......	......	......	....	......	1	1	......	1	......	1	......
....	....	....	....	....	....	......	......	2	....	1	1	3	......	1	......	....	1
....	....	....	....	2	6	23	18	26	2	18	26	33	46	22	22	20	27

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
ADIRONDACK AND NORTHERN DISTRICT										
Totals	394,772	446	14.0	91	20.8	115	140	1	8	....
WATERTOWN	21,700	42	23.5	14	33.3	9	118	....	....	....
Ellisburgh	3,888	7	......	0	......	2	285	....	....	....
Cape Vincent	2,852	2	......	0	......	1	......	....	....	....
Clayton	4,318	3	......	1	......	0	......	....	....	....
OGDENSBURG	12,633	14	......	2	14.2	0	......	....	....	....
Gouverneur	6,000	10	......	4	40.0	1	400	....	....	....
Potsdam	8,848	......	......	......	......	......	......	....	....	....
Canton	6,387	11	......	2	19.2	3	90	....	....	....
Malone	5,985	9	......	3	33.3	2	222	....	....	....
Plattsburg	8,434	14	......	6	42.8	3	214	....	....	....
Glens Falls	12,618	14	......	1	7.1	6	142	....	1	....
Whitehall	4,377	2	......	0	......	0	......	....	....	....
Fort Edward	5,216	7	......	3	42.8	1	428	....	....	....
Sandy Hill	4,478	5	......	1	20.0	0	210	....	....	....
Granville	5,217	9	......	0	......	2	222	....	....	....
Greenwich	4,172	7	......	0	......	4	......	....	....	....
Lowville	3,746	3	......	0	......	2	......	....	....	....
Rest of District	279,000	287	12.5	54	19.0	77	188	1	7	....
MOHAWK VALLEY DIST.										
Totals	420,000	510	14.7	125	24.6	116	155	6	15	....
SCHENECTADY	47,625	69	17.6	19	28.6	8	115	....	....	....
Cobleskill	3,978	7	......	2	......	2	......	....	....	....
AMSTERDAM	20,929	27	15.6	9	33.3	4	300	....	2	....
Fort Plain	2,244	7	......	1	14.2	2	......	....	....	....
JOHNSTOWN	10,130	10	......	2	20.0	3	300	1	....	....
GLOVERSVILLE	18,349	16	10.0	2	12.5	4	92	....	....	....
LITTLE FALLS	10,381	6	......	3	50.0	0	166	1	....	....
Herkimer	5,555	5	......	1	20.0	1	200	....	....	....
Ilion	5,138	10	......	6	60.0	1	200	2	....	....
UTICA	56,383	69	14.7	27	40.0	2	275	1	4	....
Whitestown	6,235	9	......	3	33.3	2	111	....	....	....
ROME	15,343	21	16.0	4	19.0	5	240	....	1	....
Boonville	3,332	4	......	3	75.0	0	......	....	....	....
Camden	3,745	4	......	1	25.0	1	......	....	....	....
Waterford	6,157	4	......	2	50.0	1	......	....	....	....
Mechanicville	4,695	9	......	2	22.2	2	111	....	1	....
Ballston Spa	3,923	......	......	......	......	......	......	....	....	....
Saratoga Springs	12,409	22	......	1	4.5	1	136	....	2	....
Rest of District	183,250	211	13.5	37	18.0	77	115	1	5	....
SOUTHERN TIER DISTRICT										
Totals	429,530	444	12.5	77	17.0	150	127	2	14	1
BINGHAMTON	39,647	37	12.0	10	27.0	10	175	....	....	....
Owego	5,039	8	......	2	25.0	3	125	....	....	....
Candor	3,330	6	......	0	......	4	......	....	....	....
Waverly	4,465	12	......	2	16.6	5	......	....	....	....
ELMIRA	35,672	38	13.0	4	10.5	10	157	....	4	....
Horseheads	4,944	7	......	1	14.2	1	142	....	....	....
HORNELLSVILLE	12,000	13	......	2	15.4	1	230	1	2	....
Bath	5,000	1	......	1	......	0	......	....	....	....
CORNING	11,061	11	......	0	......	4	......	....	1	....
Wellsville	5,000	6	......	2	20.0	0	200	....	1	....
OLEAN	9,462	10	......	2	20.0	3	......	....	....	....
Salamanca	4,251	5	......	3	60.0	0	400	....	....	....
DUNKIRK	11,616	8	......	2	25.0	1	250	....	....	1

FOR SEPTEMBER—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	1	3	5	45	21	34	1	55	22	48	64	33	19	31	55
....	....	....	....	....	2	3	3	3	1	4	....	5	5	4	1	3	8
....	....	....	....	....	2	....	....	....	....	....	....	1	3	1	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....
....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	1
....	....	....	....	....	....	....	2	1	....	3	....	2	1	3	....	....	2
....	....	....	....	1	....	3	1	....	....	2	....	2	....	....	....	1	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	1	....	1	....	2	1	1	2	1	1	....	1
....	....	....	....	....	....	2	....	....	....	1	1	....	1	1	....	2	1
....	....	....	....	....	....	2	1	1	....	2	1	....	1	....	....	3	3
....	....	....	....	....	....	1	1	....	....	1	1	2	4	....	....	3	....
....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....
....	....	....	....	....	....	3	....	....	....	....	1	....	1	1	1	....	....
....	....	....	....	....	....	1	2	....	....	....	2	....	....	....	....	....	....
....	....	....	....	....	....	2	....	1	....	2	1	1	....	1	1	....	....
....	....	....	....	....	....	....	1	1	....	1	1	2	1	....	....	....	....
....	....	....	....	....	....	....	....	1	....	....	....	....	....	1	....	1	....
....	....	....	1	2	1	27	10	25	....	36	12	31	45	19	13	18	39
....	1	1	2	4	7	44	34	42	3	40	42	45	66	27	41	28	62
....	....	....	....	2	....	6	7	8	1	5	3	5	7	2	10	5	8
....	....	....	....	....	....	....	1	....	....	....	3	....	....	....	....	2	1
....	....	....	....	1	....	5	2	2	....	3	1	2	2	....	4	2	1
....	....	....	....	....	....	....	1	1	....	....	....	2	1	1	....	1	....
....	....	....	1	....	....	1	2	1	....	....	....	1	1	1	1	....	....
....	....	....	....	....	....	1	....	....	....	1	5	2	1	3	1	....	2
....	....	....	....	....	....	....	....	....	....	1	....	....	1	1	....	....	2
....	....	....	....	1	....	....	....	2	....	....	1	1	....	....	....	....	....
....	....	....	....	....	....	....	3	2	....	....	....	1	....	....	....	....	2
....	....	....	....	....	4	10	5	1	....	8	2	5	10	3	4	1	11
....	....	....	....	....	....	1	1	1	....	....	....	....	1	....	1	2	2
....	....	....	....	....	....	4	1	5	....	....	1	1	1	....	3	....	4
....	....	....	....	....	....	....	....	....	....	....	....	1	1	1	....	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	2
....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	1	....	1
....	....	....	....	....	....	....	....	1	....	1	3	....	1	....	1	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	2	1	1	2	....	3	2	1	5	2	1	....	....
....	1	1	1	....	1	15	10	16	2	18	21	23	31	12	14	15	24
....	....	....	....	3	4	33	19	23	5	51	34	61	61	25	35	29	44
....	....	....	....	1	1	4	....	1	2	3	3	7	6	1	3	1	4
....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	2	2	2
....	....	....	....	....	....	....	1	....	....	....	2	2	....	....	1	....	....
....	....	....	....	....	....	....	....	....	....	2	1	1	3	1	2	....	2
....	....	....	....	....	....	2	3	5	....	1	7	3	6	3	1	....	3
....	....	....	....	....	....	1	....	....	....	2	....	1	1	2	....	....	....
....	....	....	....	....	....	....	....	....	....	2	1	3	1	....	....	....	3
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	1	....	....	2	1	1	2	....	2	....	1
....	....	....	....	....	....	....	....	....	....	2	1	....	1	....	....	....	1
....	....	....	....	....	....	....	1	....	....	3	....	1	2	....	3	....	....
....	....	....	....	....	....	2	....	....	....	1	....	....	1	....	1	....	....
....	....	....	....	....	....	1	1	....	....	2	1	1	....	1	....	....	....

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
SOUTHERN TIER DISTRICT —(*Continued*)										
JAMESTOWN	22,893	22	12.0	7	33.7	4	190	....	2	....
Westfield	2,430	7	......	1	......	1	......	....	1	....
Fredonia	4,125	5	......	2	40.0	2	200	....	....	....
Rest of District	248,600	248	13.0	35	14.0	101	112	1	3	....
EAST CENTRAL DISTRICT Totals	403,000	410	12.5	59	14.0	132	100	2	6	....
SYRACUSE	108,374	121	13.6	27	22.5	19	140	2	2	....
Baldwinsville	3,000	3	......	2	66.6	1	......	....	....	....
De Witt	5,435	4	......	0	......	0	250	....	....	....
CORTLAND	9,014	17	......	4	23.5	3	235	....	....	....
Homer	2,381	2	......	0	......	1	......	....	....	....
ONEIDA	7,942	5	......	0	......	3	......	....	....	....
Hamilton	3,744	1	......	0	......	0	......	....	....	....
Cazenovia	3,830	3	......	0	......	3	......	....	....	....
Canastota	3,300	4	......	0	......	0	250	....	....	....
Norwich	5,766	8	......	0	......	4	......	....	....	....
Oneonta	7,147	14	......	0	......	3	......	....	....	....
Worcester	2,409	......	......	......	......	......	......	....	....	....
Cooperstown	2,368	2	......	2	......	0	500	....	....	....
Walton	4,869	4	......	0	......	1	......	....	....	....
Delhi	3,243	......	......	......	......	......	......	....	....	....
Liberty	4,568	10	......	0	......	2	......	....	....	....
Rest of District	225,540	212	12.0	24	11.5	93	85	....	4	....
WEST CENTRAL DISTRICT Totals	330,600	358	13.5	66	18.7	112	143	....	9	....
AUBURN	35,000	42	14.5	8	19.0	8	200	....	1	....
ITHACA	13,136	16	......	4	......	2	......	....	1	....
Hector	4,137	3	......	1	33.3	1	......	....	....	....
Waterloo	4,256	3	......	1	33.3	1	......	....	....	....
Seneca Falls	6,519	8	......	2	25.0	3	125	....	....	....
GENEVA	10,433	25	......	7	28.0	4	280	....	2	....
Canandaigua	6,151	10	......	3	30.0	1	200	....	....	....
Manchester	4,733	12	......	2	......	1	......	....	....	....
Phelps	4,788	4	......	1	25.0	3	250	....	....	....
Penn Yan	4,650	5	......	1	20.0	2	......	....	....	....
Batavia	9,180	21	......	6	28.0	4	180	....	2	....
Dansville	3,633	......	......	......	......	......	......	....	....	....
Le Roy	3,144	4	......	1	25.0	0	250	....	....	....
Warsaw	4,341	5	......	3	60.0	1	200	....	....	....
Rest of District	206,500	200	12.0	28	14.0	81	100	....	3	....
LAKE ONTARIO AND WESTERN DISTRICT Totals	893,819	1,015	14.0	255	25.1	223	155	3	22	2
BUFFALO	370,000	454	15.1	124	27.3	71	175	1	13	1
TONAWANDA	7,421	4	......	1	25.0	2	......	....	....	....
Amherst	4,273	6	......	0	......	3	......	....	....	....
NORTH TONAWANDA	9,069	2	......	1	50.0	0	......	....	....	....
LOCKPORT	16,581	23	......	6	26.1	7	260	....	1	....
NIAGARA FALLS	19,457	27	16.7	8	30.0	2	111	....	....	....
Medina	4,716	5	......	1	20.0	0	200	....	....	....
Albion	4,477	3	......	2	66.6	0	......	....	....	....
Brockport	3,400	5	......	0	......	1	200	....	....	....
ROCHESTER	162,608	172	13.0	42	24.5	41	155	....	2	....
Palmyra	3,758	2	......	1	50.0	0	......	....	....	....

FOR SEPTEMBER—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	1	....	1	1	1	....	2	....	8	8	....	2	1	5
....	....	....	....	....	....	....	....	1	....	3	1	1	....	....	1	....	....
....	....	....	....	....	....	1	....	....	....	2	....	1	....	....	....	....	1
....	....	....	....	1	8	20	11	15	3	25	16	36	34	17	17	26	21
....	1	....	....	2	3	28	23	34	1	40	23	56	46	34	29	36	42
....	....	....	....	1	....	13	7	11	1	13	11	9	13	7	10	8	16
....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	1
....	....	....	....	1	....	....	....	1	....	....	....	....	1	....	....	....	1
....	....	....	....	....	....	4	3	1	....	....	....	1	3	1	2	1	8
....	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	3	....	3	1	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	1	....
....	1	....	....	....	....	....	....	1	....	....	1	....	....	1	....	....	....
....	....	....	....	....	....	....	3	....	....	....	3	3	....	....	....	2	....
....	....	....	....	....	....	....	1	....	....	3	2	1	3	1	2	2	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	3
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	4	....	1	3	1	....	....	1	1	....
....	....	....	....	....	2	11	11	16	....	23	10	37	24	23	13	21	18
....	1	....	....	....	9	31	16	23	1	26	19	58	53	16	33	31	37
....	....	....	....	....	4	4	2	5	....	2	....	5	5	1	6	4	3
....	....	....	....	....	....	1	....	8	....	....	1	3	3	1	....	1	4
....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	1
....	....	....	....	....	....	....	1	....	....	1	....	1	....	....	....	....	....
....	....	....	....	....	....	1	3	....	....	....	....	2	....	1	1	....	1
....	....	....	....	....	....	5	1	....	....	3	8	3	3	5	3	1	....
....	....	....	....	....	....	2	....	2	....	....	1	....	8	1	....	1	....
....	....	....	....	....	....	3	1	....	....	3	3	8	1	1	....	....	....
....	....	....	....	....	....	1	....	....	....	....	....	1	3	....	....	....	....
....	....	....	....	....	....	....	....	1	....	1	....	....	1	....	....	....	3
....	....	....	....	....	....	3	1	1	....	....	3	3	8	....	3	3	4
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	1	....	1	....	....	....	....	....	....	1	....	1
....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	8
....	1	....	....	....	5	11	7	10	1	18	10	35	33	5	21	22	18
....	2	....	1	6	23	99	54	83	18	99	60	100	124	72	76	56	120
....	1	....	....	4	9	50	30	39	7	35	29	45	31	48	40	19	52
....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	2	1
....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	1	2	1
....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....
....	....	....	....	....	2	3	8	1	....	8	....	2	2	....	....	3	8
....	....	....	....	....	....	8	....	3	1	8	1	1	8	1	6	....	5
....	....	....	....	....	....	1	1	....	....	1	....	....	2	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	1
....	....	....	1	....	....	....	1	1	....	....	1	1	....	....	....	....	....
....	1	....	....	1	8	15	11	14	1	20	11	13	29	9	10	11	16
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1

MONTHLY BULLETIN

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
LAKE ONTARIO AND WESTERN DIST.—(*Con.*)										
Newark	4,578	7	......	1	14.2	1	142	....	....	....
Lyons	5,324	6	......	2	33.3	1	......	....	....	....
Clyde	2,507	5	......	0	....	2	200	....	1	....
OSWEGO	22,200	25	14.0	6	28.0	5	160	....	1	....
FULTON	8,734	9	......	1	11.1	3	222	....	1	....
Richland	3,585	7	......	2	28.5	3	......	....	....	....
Rest of District	244,184	253	12.5	56	22.5	80	130	2	3	1
Total for the State	7,910,000	9,468	14.5	2,837	30.0	1,496	171	29	170	18
Average for past 5 years	....	10,175	17.0	3,607	35.5	1,497	210	40	234	42

REMARKS—The chief characteristic of the weather for the month was the unusual clearness of the atmosphere that generally prevailed, there having been from 8 to 15 clear days in all parts of the State and an average of but 5 cloudy days in the month, these conditions being most marked in the northern and central part, although there were 10 days on which there was at least a trace of rain. The rainfall, which was excessive in August, accompanied by temperature much below the normal, is this month little above one-half the average for September. The average mean temperature was slightly above the normal, having been but two degrees below that of August, the mean maximum temperature having been 72 degrees and the minimum 55 degrees, with highest temperatures of 88 degrees, which is above the highest of August. The average of least rainfall in 30 years during September has been 0.63 inch and of highest 6.88 inches. Highest velocities of wind were 45 miles per hour.

REGISTRATION OF BIRTHS, MARRIAGES AND DEATHS—Correct records of births, marriages and deaths are of the greatest value to the State statistically, as well as for legal and administrative purposes.

The State Department of Health before adopting the present forms of birth, marriage and death blanks gave a great deal of study to the question, that only such information should be required as was necessary to make the records of value, and as no needless questions are asked, it is the duty of local registrars to secure as complete records of the different events as is possible.

As shown by the United States Census for the year 1900, some 12,000 births occurred in this State outside of the city of New York of which there were no local records, while some 5,000 marriages and 3,000 deaths failed of record. It is therefore urged upon all local boards of health to secure and make complete records of all births, marriages and deaths occurring within their respective municipalities.

Referring to certificates now on file in the State Bureau of Registration, it is found that many of them are defective, and in order to obviate such defects in the future, the attention of local registrars is called to some of the most serious causes of complaint.

Under the head of "Place of Registry" in the upper left hand corner, many certificates of birth, marriage and death are either not filled out at all or are incorrectly filled out. This portion of the certificate should give the name of the county and the town, village or city in such county *in which the death occurs*, not the town, village or city in which the attending physician or undertaker resides, as is often given.

In births the given and family name of the child should be furnished; in the event of the child not being named when the report of the birth is made, the registrar should furnish the parents with a "given-name card" to be filled out and returned to him when the child is named, that he may complete the local record of the birth, after which the given-name card should be sent to this Department to be attached to the original record of the birth. The signature of the attendant at a birth, the date and place of birth as well as the sex of the child are also important points to be considered in connection with a complete birth record.

FOR SEPTEMBER—(*Concluded*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	1	......	......	1	......	....	......	2	1	......	1	1
....	....	....	....	....	....	......	......	1	....	2	....	......	1	....	......	1	1
....	....	....	....	....	....	......	......	......	....	1	1	1	1	....	......	....	......
....	....	....	....	....	....	3	1	2	....	3	3	4	2	....	2	1	3
....	....	....	....	....	....	1	......	......	....	1	2	......	2	....	1	1	......
....	....	....	....	....	....	......	1	......	....	2	....	1	1	....	1	1	......
....	....	....	....	1	4	22	6	22	8	28	10	81	45	18	13	14	86
....	84	16	12	51	186	1,108	765	946	69	634	710	907	944	475	681	322	1,896
3	24	20	12	83	164	1,540	717	988	66	932	682	801	963	376	647	428	1,398

In marriage certificates defects exist by reason of the failure of the certificate to give the name of the person performing the ceremony, also as to signatures of witnesses to the ceremony as required on the face of the certificate as well as the signatures of the contracting parties and the witnesses on the reverse side of same.

Death certificates are many times found defective in the following respects:

In giving name of deceased, the full name should be used instead of initials; for example, "J. Brown" should be "John Brown," and instead of "Mrs. John Brown," it should be "Mary Brown."

Place of death is very important, also date, age and sex of deceased. The attending physician should make his portion of the certificate as complete as possible.

Another serious error is found in connection with death certificates, and that is, when death occurs in one municipality, and an undertaker living in another municipality is called to take charge of the remains; in many such cases it appears to be the custom of the undertaker to file the death certificate and procure a burial permit thereon from the Board of Health of the municipality in which he resides, instead of from the Board of Health of the municipality in which the death occurs, as all births, marriages and deaths must be recorded in the municipalities in which the different events occur.

It is also found that justices of the peace as members of town boards of health, in some cases, issue death certificates for which there is no authority under the law, section 23 of the Public Health Law making it the duty of the physician last in attendance upon deceased to issue a death certificate, and no physician being in attendance, and no inquest being required by law, a death certificate should be filled out by a relative or some responsible person, such certificate to be accompanied by an affidavit stating the circumstances, time and cause of death.

In cases of still-births, this Department has prescribed a blank form known as a "Still Birth" which acts as a birth and death certificate; such record should be kept by the registrar in a separate book and the certificates filed in his office instead of sending them to the State Bureau.

If the different registrars of the State, aided by the Health Officers as executive officers of the local boards, will endeavor to make their records of births, marriages and deaths as complete as possible, it will aid the State Department very materially in its efforts to secure satisfactory returns.

See that all information given on the certificates is written legibly and with ink.

Births and marriages should be reported within thirty days after their occurrence, to the local boards of health of the municipalities in which the events occur.

No burial of a dead body should be permitted until the certificate of death has been presented to the person authorized to issue a burial permit; after issuing a burial permit thereon, the death certificate should be at *once* forwarded to the Registrar of Vital Statistics of the municipality in which the death occurred.

All certificates of birth, marriage and death received by a Registrar in one month, after registration by him, should be forwarded to the State Bureau of Vital Statistics between the first and fifth of the following month; for example, certificates received and recorded during the month of September should be sent to the State Bureau not later than October 5th.

MONTHLY BULLETIN OF THE NEW YORK STATE

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
MARITIME DISTRICT Totals	4,052,875	5,506	16.4	1,692	30.7	587	135	19	88	9
CITY OF NEW YORK Totals	3,732,903	5,123	16.1	1,601	31.0	509	135	17	84	8
BOROUGH OF MANHATTAN	1,917.676	2,708	16.6	884	32.6	229	140	10	46	2
BOROUGH OF THE BRONX	268,341	393	17.2	78	19.2	45	90	....	2	1
BOROUGH OF BROOKLYN	1,291,597	1,710	15.6	550	32.5	190	145	5	83	4
BOROUGH OF QUEENS	182,681	208	13.0	63	31.0	16	150	2	2	....
BOROUGH OF RICHMOND	72,608	104	16.3	26	25.5	29	100	....	1	1
Oyster Bay	16,334	5	.....	1	20.0	1	.....	....	....	....
Hempstead	27,066	28	12.2	11	38.5	3	110	....	....	....
North Hempstead	12,048	16	.....	4	25.0	4	250	....	1	....
Southold	8.301	8	.....	3	37.5	2	.....	....	....	....
Sag Harbor	3,500	2	.....	1	50.0	0	.....	....	....	....
Huntington	9,483	7	.....	1	15.5	4	155	....	1	....
Brookhaven	14,592	21	.....	2	10.0	6	50	....	1	....
YONKERS	50,000	73	17.2	19	26.0	10	125	1	....	....
Greenburgh	15,564	23	.....	4	15.0	4	110	....	....	....
MOUNT VERNON	20,346	20	12.0	6	30.0	8	.....	....	....	1
Port Chester	7,440	15	.....	3	20.0	3	135	....	....	....
Ossining	7.939	7	.....	0	.....	2	.....	....	....	....
NEW ROCHELLE	14,720	15	.....	1	7.0	1	.....	....	....	....
Peekskill	10,358	14	.....	3	21.5	4	142	....	....	....
White Plains	7,900	10	.....	3	30.0	1	.....	....	....	....
Rest of District	94,382	119	15.5	29	25.0	25	100	1	1	....
HUDSON VALLEY DIST. Totals	695,992	881	15.0	153	24.0	210	95	1	15	2
ALBANY	100.000	137	16.1	19	13.8	27	80	....	3	....
COHOES	24,000	33	16.1	7	21.0	3	185	....	1	....
TROY	75,057	108	16.8	22	20.3	22	92	....	3	....
WATERVLIET	14,321	15	.....	5	33.3	1	135	....	....	....
Green Island	4,770	9	.....	2	22.2	2	110	....	....	....
Hoosick Falls	5,671	15	.....	2	13.5	3	65	....	....	....
RENSSELAER	7,466	13	.....	4	30.0	3	230	....	1	....
Coxsackie	4,102	13	.....	2	15.5	2	150	....	....	....
Catskill	5,486	6	.....	2	33.3	0	333	....	1	....
HUDSON	9,528	11	.....	2	18.2	2	180	....	....	....
KINGSTON	24,535	27	13.0	5	18.5	5	110	....	....	1
Ellenville	3,000	5	.....	0	.....	3	.....	....	....	....
Marbletown	3,511	5	.....	1	20.0	3	.....	....	....	....
Rosendale	6,278	7	.....	1	14.2	1	140	....	....	1
Esopus	4,907	5	.....	1	20.0	0	60	....	....	....
Saugerties	3,700	4	.....	0	.....	0	.....	....	....	....
POUGHKEEPSIE	24,029	28	14.0	7	25.0	5	35	....	....	....
Fishkill	13.016	13	.....	4	30.0	2	75	....	....	....
Wappingers Falls	3,504	5	.....	0	.....	1	.....	....	....	....
NEWBURG	25,000	32	15.0	5	15.0	4	125	....	2	....
Port Jervis	9,385	12	.....	1	8.3	0	.....	....	....	....
MIDDLETOWN	14,522	16	.....	3	28.5	4	.....	....	....	....
Warwick	6,403	10	.....	2	20.0	4	200	....	....	....
Goshen	4,564	6	.....	0	.....	2	.....	....	....	....
Montgomery	5,939	6	.....	1	16.7	1	500	....	....	....
Haverstraw	9,874	7	.....	2	28.5	0	285	....	....	....
Nyack	4,275	3	.....	0	.....	2	.....	....	....	....
Ramapo	7,502	16	.....	3	20.0	1	65	....	....	....
Rest of District	271,800	314	14.0	50	16.0	107	80	1	4	....

DEPARTMENT OF HEALTH—VOLUME XIX

districts, cities, villages and towns during October, 1903

villages in *italic* and towns in Roman type.]

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	26	20	5	16	165	401	685	675	57	248	486	470	451	240	393	69	983
....	23	19	5	18	159	381	658	640	55	222	451	480	394	217	378	51	928
....	6	7	5	9	62	234	377	290	27	128	219	243	209	118	198	24	494
....	6	1	....	1	10	15	27	119	4	8	33	20	28	15	35	1	67
....	9	11	....	3	72	112	218	194	19	76	178	142	129	74	105	17	309
....	2	....	....	....	12	14	26	24	3	8	15	15	22	5	21	3	34
....	....	....	....	....	3	6	10	13	2	2	6	10	6	5	14	6	19
....	....	....	....	....	....	....	1	....	....	1	1	1	1	....	....	....	....
....	....	....	....	1	....	2	1	....	....	4	5	....	3	5	3	....	4
....	....	....	....	....	1	2	1	1	....	....	....	3	1	3	2	1	....
....	....	....	....	....	....	2	1	....	....	1	1	....	....	....	1	1	1
....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	....	....	2	2	....	....	....	1	1
....	....	....	....	....	....	....	....	2	....	....	1	2	4	2	....	5	4
....	2	....	....	1	2	3	8	11	....	7	8	5	6	4	1	1	13
....	....	....	....	....	....	2	....	4	....	....	....	6	2	....	1	1	4
....	....	....	....	....	....	....	3	....	1	1	2	2	6	1	....	1	5
....	....	....	....	....	1	1	....	2	....	....	2	1	2	2	1	1	2
....	....	....	....	....	....	....	....	....	....	....	2	1	....	2	....	1	1
....	....	....	....	....	....	....	1	1	....	1	1	2	3	2	....	....	4
....	....	1	....	....	....	1	....	1	....	1	3	3	1	....	2	....	1
....	....	....	....	....	....	....	2	2	....	....	1	....	2	....	....	....	3
....	1	....	....	1	2	7	9	11	1	9	6	12	26	2	9	5	16
....	9	5	1	3	18	31	52	98	7	78	81	125	109	45	66	47	98
....	1	5	....	....	1	1	7	17	1	11	14	38	7	8	8	3	12
....	3	....	1	....	....	1	....	5	1	2	2	1	6	2	....	3	5
....	....	....	....	1	5	1	11	13	....	5	7	13	15	9	9	3	13
....	....	....	....	....	1	1	4	2	....	....	3	1	1	1	....	....	1
....	....	....	....	....	....	1	....	....	....	....	4	....	1	....	....	1	2
....	....	....	....	....	....	1	....	....	1	3	2	2	2	1	1	1	1
....	....	....	....	....	....	2	2	....	....	2	....	1	3	1	....	....	1
....	....	....	....	....	....	2	1	....	....	....	1	1	....	2	3	....	3
....	....	....	....	....	1	....	....	....	....	1	....	....	....	....	2	....	1
....	....	....	....	....	1	1	....	2	....	....	2	1	1	....	3	....	....
....	....	....	....	....	....	2	3	1	1	8	2	7	2	....	1	1	3
....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	3	....
....	....	....	....	....	....	....	....	....	....	1	....	....	2	....	....	1	1
....	....	....	....	....	....	....	1	1	....	1	....	....	1	1	....	....	1
....	2	....	....	1	....	....	....	1	....	....	1	....	....	....	....	....	....
....	....	....	....	....	....	....	....	2	....	....	....	....	1	1	....	....	....
....	....	....	....	....	....	1	1	5	....	1	1	4	5	2	3	1	4
....	....	....	....	....	....	1	1	1	....	1	1	2	3	....	1	1	1
....	....	....	....	....	....	....	....	1	....	1	1	2	....	....	....	....	....
....	....	....	....	....	2	....	4	4	....	2	4	5	3	....	2	....	4
....	....	....	....	....	....	....	....	....	1	....	2	....	1	2	6	....	....
....	....	....	....	....	....	....	1	1	1	2	4	1	2	1	1	1	1
....	....	....	....	....	....	2	1	2	....	2	1	....	1	....	....	1	....
....	....	....	....	....	....	....	....	1	1	1	....	1	1	....	....	1	....
....	....	....	....	....	2	1	....	....	....	....	1	....	2	....	....	....	....
....	....	....	....	....	2	....	....	1	....	....	....	....	....	1	....	....	8
....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	2	....
....	....	....	....	....	....	1	1	4	....	....	....	2	2	....	2	....	4
....	3	....	....	1	3	12	13	34	....	34	27	43	47	13	23	24	32

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
ADIRONDACK AND NORTHERN DISTRICT Totals	394,829	437	13.1	79	18.1	121	128	4	12	....
WATERTOWN	21,700	28	15.2	3	10.8	6	70	....	....	....
Ellisburgh	3,333	3	......	1	33.3	1	......	....	....	....
Cape Vincent	2,333	5	......	1	20.0	2	......	....	....	....
Clayton	4,318	3	......	1	33.3	1	......	....	....	....
OGDENSBURG	12,633	27	......	4	15.0	8	75	....	1	....
Gouverneur	6,000	3	......	1	33.3	0	333	....	....	....
Potsdam	3,843	2	......	0	......	0	......	....	....	....
Canton	6,337	6	......	1	16.7	0	167	....	....	....
Malone	5,935	......	......	......	......	......	......	....	....	....
Plattsburg	8,434	14	......	4	28.5	4	75	....	....	....
Glens Falls	12,613	13	......	3	23.0	2	75	....	....	....
Whitehall	4,377	3	......	1	33.3	1	333	....	1	....
Fort Edward	5,216	9	......	0	......	5	......	....	....	....
Sandy Hill	4,473	4	......	1	25.0	1	250	....	....	....
Granville	5,217	2	......	0	......	1	......	....	....	....
Greenwich	4,172	2	......	0	......	0	......	....	....	....
Lowville	3,746	4	......	1	25.0	1	......	....	....	....
Rest of District	279,000	309	13.5	57	15.0	88	150	4	10	....
MOHAWK VALLEY DIST. Totals	420,000	529	15.0	100	19.0	151	87	2	12	....
SCHENECTADY	47,625	46	12.0	16	34.5	3	130	....	3	....
Cobleskill	3,973	4	......	1	25.0	2	250	....	....	....
AMSTERDAM	20,929	22	12.5	4	18.2	2	......	....	....	....
Fort Plain	2,444	4	......	0	......	2	......	....	....	....
JOHNSTOWN	10,130	11	......	2	18.2	5	......	....	....	....
GLOVERSVILLE	18,349	23	......	2	8.5	3	45	....	....	....
LITTLE FALLS	10,381	13	......	1	7.5	6	......	....	....	....
Herkimer	5,555	11	......	1	9.0	2	90	....	....	....
Ilion	5,138	6	......	4	66.6	2	333	1	....	....
UTICA	56,383	95	19.5	24	25.0	25	195	....	....	....
Whitestown	6,235	3	......	2	66.0	0	......	....	....	....
ROME	15,343	29	......	5	17.0	11	35	1	....	....
Boonville	3,332	2	......	1	50.0	0	......	....	....	....
Camden	3,745	......	......	......	......	......	......	....	....	....
Waterford	6,157	7	......	1	14.2	3	......	....	....	....
Mechanicville	4,695	5	......	1	20.0	0	......	....	....	....
Ballston Spa	3,923	4	......	0	......	3	......	....	....	....
Saratoga Springs	12,409	20	......	1	5.0	4	50	....	....	....
Rest of District	183,250	224	14.5	34	15.2	78	100	....	9	....
SOUTHERN TIER DISTRICT Totals	429,534	509	13.5	85	17.0	155	110	2	14	1
BINGHAMTON	39,647	57	16.7	5	8.5	18	50	....	....	....
Owego	5,039	10	......	5	50.0	0	100	....	....	....
Candor	3,330	3	......	0	......	1	330	....	....	1
Waverly	4,465	7	......	3	42.8	2	285	....	....	....
ELMIRA	35,672	45	15.0	4	9.0	11	110	....	3	....
Horseheads	4,944	3	......	1	33 3	1	333	....	1	....
HORNELLSVILLE	12,000	24	......	5	27.5	2	165	....	....	....
Bath	5,000	8	......	0	......	1	......	....	....	....
Corning	11,061	12	......	2	16.7	3	250	1	1	....
Wellsville	5,000	7	......	1	14.2	2	......	....	....	....
OLEAN	9,462	7	......	2	28.5	1	285	....	....	....
Salamanca	4,251	5	......	2	40.0	2	......	....	....	....
DUNKIRK	11,616	25	......	8	32.0	3	200	....	2	....

FOR OCTOBER—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	2	....	....	2	1	35	29	41	4	38	24	56	54	20	18	39	58
....	....	....	....	....	1	1	2	2	....	4	....	7	2	1	....	3	5
....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	1	....
....	....	....	....	....	....	....	1	....	....	....	1	2	1	....	....	....	....
....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....	1	....
....	....	....	....	....	....	1	2	5	....	1	2	2	2	2	2	4	3
....	....	....	....	....	....	1	....	1	....	....	....	1	....	....	....	....	....
....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
....	....	....	....	1	....	....	....	....	....	....	1	....	1	1	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	1	2	1	....	1	....	2	3	....	....	2	3
....	....	....	....	....	....	1	1	....	1	1	....	2	2	....	1	1	3
....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	2	2	2	....	....	1	2	....
....	....	....	....	....	....	1	....	....	....	....	....	2	1	....	....	....	....
....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1	....
....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	1	1	....	1	....	....	1
....	2	....	....	1	....	28	20	29	3	26	16	34	41	15	14	24	42
....	1	....	1	2	12	16	33	42	6	53	45	56	83	20	31	44	70
....	1	....	....	....	....	2	4	6	1	5	5	3	5	1	2	....	8
....	....	....	....	....	....	1	....	....	....	....	....	2	....	1	....	....	....
....	....	....	....	....	....	....	1	2	1	4	3	2	3	1	3	1	1
....	....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	2	....
....	....	....	....	....	....	....	1	....	....	....	1	1	3	1	1	2	1
....	....	....	....	....	1	....	....	....	1	2	3	6	2	1	2	1	4
....	....	....	....	....	....	....	....	1	....	....	1	3	3	1	....	2	2
....	....	....	....	....	....	1	....	1	1	1	....	3	1	1	....	....	2
....	....	....	....	....	....	1	....	....	....	....	....	....	2	....	....	....	2
....	....	....	1	1	6	1	10	12	....	5	9	9	18	4	4	3	12
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	2
....	....	....	....	....	....	....	2	....	....	4	3	2	6	....	3	4	4
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	1	1	1	2	....	....	1	1
....	....	....	....	....	....	....	....	....	....	1	1	1	1	....	1	....	....
....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	2	....
....	....	....	....	....	....	1	....	2	....	2	5	3	4	1	1	1	....
....	....	....	....	1	4	9	15	17	2	28	12	20	30	8	13	25	30
....	2	....	....	2	18	24	33	46	2	47	32	63	68	27	33	39	68
....	....	....	....	....	1	2	7	8	....	3	....	7	8	4	8	4	5
....	....	....	....	....	1	....	....	2	....	....	....	....	....	1	1	....	5
....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....
....	....	....	....	....	....	2	1	1	....	1	....	1	....	....	....	....	1
....	....	....	....	....	....	2	4	4	....	2	5	9	4	3	4	2	3
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1
....	....	....	....	....	3	1	2	1	1	1	1	3	7	1	....	1	2
....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	1
....	....	....	....	....	1	....	....	2	....	1	2	1	2	....	1	....	....
....	....	....	....	....	....	....	1	1	....	1	....	1	1	....	....	1	1
....	....	....	....	....	1	1	1	....	....	....	1	....	....	1	1	....	1
....	....	....	....	....	....	....	1	....	....	....	1	....	2	....	....	....	1
....	2	....	....	1	....	....	2	2	1	5	1	2	....	1	2	....	4

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
SOUTHERN TIER DISTRICT —(*Continued*)										
JAMESTOWN	22,892	29	15.0	9	33.5	7	165	....	....	....
Westfield	2,430	......	......	......	......	......	......	....	....	....
Fredonia	4,125	5	......	1	20.0	2	......	....	....	....
Rest of District	248,600	267	13.0	37	14.0	99	100	1	7	....
EAST CENTRAL DISTRICT Totals	401,930	446	13.0	59	13.2	150	85	1	10	....
SYRACUSE	108,374	124	14.0	20	16.1	25	80	....	3	....
Baldwinsville	3,000	1	......	0	......	0	......	....	....	....
De Witt	5,485	4	......	0	......	0	......	....	....	....
CORTLAND	9,014	8	......	0	......	5	......	....	....	....
Homer	2,881	3	......	1	33.3	1	333	1	....	....
ONEIDA	7,942	5	......	0	......	2	......	....	....	....
Hamilton	3,744	3	......	0	......	0	333	....	1	....
Cazenovia	3,830	6	......	0	......	3	......	....	....	....
Canastota	3,300	8	......	3	37.5	1	125	....	....	....
Norwich	5,766	11	......	3	27.5	3	......	....	....	....
Oneonta	7,147	10	......	2	20.0	4	200	....	....	....
Worcester	2,409	5	......	1	20.0	3	200	....	....	....
Cooperstown	2,368	5	......	0	......	1	200	....	1	....
Walton	4,869	1	......	0	......	1	......	....	....	....
Delhi	3,243	10	......	0	......	5	......	....	....	....
Liberty	4,568	18	......	3	16.6	3	55	....	....	....
Rest of District	225,540	224	13.0	26	11.5	93	90	....	5	....
WEST CENTRAL DISTRICT Totals	330,600	407	14.7	67	16.2	119	110	....	15	....
AUBURN	35,000	35	12.0	6	17.5	5	142	....	1	....
ITHACA	13,136	23	......	3	13.0	8	130	....	2	....
Hector	4,137	5	......	1	20.0	1	......	....	....	....
Waterloo	4,256	5	......	1	20.0	0	200	....	1	....
Seneca Falls	6,519	5	......	0	......	1	......	....	....	....
GENEVA	10,443	9	......	0	......	2	250	....	1	....
Canandaigua	6,151	11	......	1	9.0	3	190	....	1	....
Manchester	4,783	8	......	1	12.5	1	125	....	....	....
Phelps	4,788	7	......	1	14.3	4	140	....	....	....
Penn Yan	4,650	6	......	0	......	0	......	....	....	....
Batavia	9,180	13	......	2	15.0	2	......	....	....	....
Dansville	3,633	11	......	2	19.0	3	190	....	....	....
Le Roy	3,144	4	......	0	......	1	250	....	....	....
Warsaw	4,341	3	......	1	33 3	0	......	....	....	....
Rest of District	206,500	262	15.0	48	18.0	88	100	....	9	....
LAKE ONTARIO AND WESTERN DISTRICT Totals	897,272	1,071	14.1	223	20.8	231	120	2	23	....
BUFFALO	370,000	442	14.3	115	26.0	80	260	....	12	....
TONAWANDA	7,421	13	......	3	23.0	4	75	....	....	....
Amherst	4,223	4	......	0	......	2	......	....	....	....
NORTH TONAWANDA	9,069	14	......	6	42.5	1	215	....	3	....
LOCKPORT	16,581	24	......	5	20.8	6	85	....	1	....
NIAGARA FALLS	19,457	33	......	7	21.0	1	210	....	3	....
Medina	4,716	3	......	0	......	0	......	....	....	....
Albion	4,477	9	......	2	22.2	2	110	....	....	....
Brockport	3,400	7	......	1	14.3	3	285	....	....	....
ROCHESTER	162,608	196	14.3	28	14.0	31	110	1	3	....
Palmyra	3,758	6	......	0	......	4	166	....	....	....

FOR OCTOBER—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
					2	3	2	8		2		3	8	2		1	8
								1		1	1			1			1
				1	4	18	9	21		30	20	34	36	12	21	29	29
		1	1	2	6	17	34	43	3	36	28	65	73	18	23	39	46
					2	5	13	15	1	10	8	17	16	3	7	7	17
													1				
												1	1	1			1
													2	2		8	1
										1						1	
							1					2		1		1	
							1					1					
										1		1			1	2	1
						1		1					1		1		4
							2			2		2	8				2
			1			1					2	2	1		2	1	
						1							1			2	1
								1				2		1			
																1	
							2				1	1	6				
						1	1	9				2			2	1	2
		1		2	4	8	14	17	2	22	17	34	41	10	10	20	17
				1	7	22	24	23	2	32	25	69	50	27	26	37	39
					3	1	2	4		2	1	2	5	5	3	2	4
						1	2	2	1		1	6	3	1	1	2	1
							1			1			1	2			
								1						1	1		1
							1	1				2					1
						1				1		2	1	1		2	
						1	1				1	3			1	3	1
						1				2	1	2	1			1	
				1			2				1	1		1		1	
										1	1	3			1		
							2			2	2	1	1	2	1		2
						2		1		3		2	1	1	1		
					1					1	1	1					
												1			1		1
					3	15	13	13	1	19	16	44	46	13	16	26	23
	5	1	5	3	34	52	79	71	6	90	70	185	152	59	73	55	151
	3	1	4	1	11	29	33	28	2	29	27	61	56	11	36	19	74
						1		1		1	1	2	1		1	2	3
								1			1		2				
							1					1	3	1			5
					1		1	3		4		5	1	1	2	3	3
	1			1		2	2	1	1	5	1	4	3			1	5
								1				1	1				
						1					1	1	2		1	1	2
					1	1					1		1			2	1
					15	3	21	16		25	18	28	25	7	6	9	19
						1					1	2				1	1

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
LAKE ONTARIO AND WESTERN DIST.—(*Con.*)										
Newark	4,578	6	.....	2	33.3	3	.....	....	....	....
Lyons	5,824	5	.....	0	.....	2	.....	....	....	....
Clyde	2,507	5	.....	0	.....	1	.....	....	....	....
OSWEGO	22,200	29	.....	5	17.0	8	135	....	....	....
FULTON	8,784	9	.....	4	44.4	2	110	....	....	....
Richland	3,535	3	.....	1	33.3	1	.....	....	....	....
Rest of District	244,184	266	13.5	44	16.6	80	96	1	6	....
Totals for the State	7,910,000	9,786	15.0	2,458	25.0	1,724	123	31	194	12
Average for past five years	....	9,560	16.0	2,814	29.5	1,628	135	36	245	34

REMARKS—In the eastern part of the State the rainfall was greatly in excess of the normal, and especially in New York city, where 11½ inches fell, exceeding by four inches any October in thirty years. In the western stations the amount was near or below the average. The average of the highest previous rainfalls in this month of the five stations is 7½ inches, and they none of them vary far from this, although not occurring in the same year. The same is true of the smallest recorded rainfalls, which are about half an inch. The temperature everywhere was one or two degrees above the normal, the average of the mean maximum temperature being 60° and of the mean minimum 47°. Temperatures in excess of the mean for the month prevailed everywhere during the first three weeks. The clear atmosphere of September gave place to cloudiness, there having been but 6 clear days, and precipitation occurred on 18; in the west, although the amount of rainfall was less, there were fewer clear days than in the east. Highest velocities of wind were 45 to 58 miles per hour on the seaboard and lakes and 30 to 38 inland.

SMALLPOX has existed in few places till recently, and no deaths from it have occurred in the State for several months. With the advent of colder weather it has developed more widely, and in some localities unsuspected prevalence has existed for several weeks. The following places have smallpox in their municipality, in the majority of them for a considerable time: In Chautauqua county, in the towns of Mayville, Falconer, Carroll, Stockton, Charlotte and very possibly in other towns of the county; at Sandusky, Cattaraugus county; in the northern part of the State, at Indian Lake and the town of Arietta, Hamilton county, in the town of Johnsburgh, Warren county, at Tupper Lake, Franklin county, and at Corinth, Saratoga county. In Orleans county there has been an extensive epidemic at Medina and the town of Ridgeway, also cases in the town of Gates; at Clyde in Wayne county; there are cases in the towns of Middleport and Barker, Niagara county; a case in the city of Buffalo, in Cortland, and in the town of Groton, Tompkins county. Outside of these three general centres there are a number of cases in the town and village of Haverstraw, in the Hudson Valley region, among negro brickyard laborers who have imported the disease from outside and doubtless from Southern points; also in the village and town of Ossining, across the river, but, so far as known, unconnected with them. A case has lately been discovered in Cohoes.

So far as known these include all existing localities, but it is not improbable that there are others where it has not been recognized, since we have found this to have been the case in some of the places referred to. It seems somewhat extraordinary that this should be the case, to those unfamiliar with smallpox; and, indeed, to those who are not, it would appear as if the medical men of the State, after years of schooling in the generally mild and unusual form of this disease, would at least suspect the nature of a prevailing eruptive disease. The diagnosis may be elusive in certain cases, even to one skilled in it, but the physician seeing them from day to day ought to know them by what he finds they certainly are not. From time to time the Department gets information of an epidemic which has existed for weeks unsuspected or at least unreported until an undoubted case occurs to awaken suspicion; Clyde is an instance where many cases are now found and where for weeks it has prevailed, although smallpox was known to be prevalent in Medina and places less remote. In consequence it becomes widespread in the community and reaches other towns in the vicinity.

We wish to say to Health Officers that they must require the report to them of every case of papular eruptive disease attended at the outset with fever, even trivial in character, and to seclude all such until diagnosis is clear. If this onset

FOR OCTOBER—(*Concluded*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	....	......	......	....	1	1	1	1	....	......	1	1
....	....	....	....	....	....	......	......	......	....	....	....	......	......	2	2	1	....
....	....	....	....	....	....	......	......	1	....	......	....	......	2	....	2	....	....
....	....	....	....	....	4	......	2	8	....	1	4	2	4	1	3	....	5
....	....	....	....	....	....	1	1	......	....	1	....	1	2	....	1	....	2
....	....	....	....	....	....	......	......	......	....	......	....	2	1	....	......	....	......
....	1	....	1	1	2	13	13	16	8	23	14	24	47	86	19	16	80
....	45	27	18	31	256	598	968	1,038	87	617	791	1,068	1,044	456	668	369	1,508
4	38	19	14	55	227	621	1,015	1,057	61	800	751	890	991	397	545	424	1,318

fever has lasted for more than a day and the subject is an adult, or if there is no evidence of effective vaccination and other cases show it to be contagious, it is almost certain to be smallpox. A simpler rule than this cannot be given.

Is its mildness, even at times insignificance, a reason for ignoring it? This has been a general popular feeling, notably in Chautauqua county, where smallpox has been endemic for at least a year, so that the health authorities have been sadly hampered in their work. It surely should not be, because, even if an individual is not averse to running the risk of the disease, he has no right to jeopardize others; and because while many cases are mild it may be taken in severe and fatal form from the mildest possible case, as we have seen instances of. We need a public sentiment in some localities, not of unreasonable fear, but certainly not of apathy and disregard, which is worse, that unfortunately actuates the public mind here and there, to the serious interference with the work of health officials. It is hardly possible to execute any law in a community which does not sympathize with its propriety and enforcement. Now, after an apparent abeyance of smallpox prevalence, which came last summer after years of widespread existence, it is quite possible that we may have it recurring this winter widely unless the people are right minded towards it and the medical profession are likewise ready to coöperate in its control. One uncontrolled locality causes its spread to other places near and remote.

The question has come to the State Department several times of late as to whether an embargo shall be placed against an adjoining town in which smallpox is prevalent. It would no doubt be entirely justifiable so far as the affected town is concerned, in case it is lax in the proper care of its cases, to place guards on the highways and shut off all communication with it. Self preservation would sometimes seem to require this. But it is not recommended; first, because in certain cases where we have seen it done it has not proved to be effective as a remedial protection. But the chief reason is that it turns the public mind away from a measure of protection which is absolute to the individual and, if general, to the community, i. e., *vaccination*. The public need to have this constantly enforced. There is no other means of protection that has any comparative value. If all our people were effectively vaccinated, cases of smallpox could come from other States or countries as they constantly have been doing these years past, with perfect impunity so far as our people are concerned. They are as certain not to take smallpox as they would be if they had already secured immunity by having had it. Therefore we urge in reply to these inquiries upon all who have the responsibility of protecting their towns from a neighboring infected locality that they use every means to secure this individual protection to their people. It is economical, safe and certain, far more so in all these respects than any other means of protection that we have; therefore it should be made, and the people educated to regard it as the primary and fundamental means of securing protection from a disease which even in its mildest form is most undesirable to have.

Save in one direction compulsory vaccination is not on the statute books of this State. It is a law, however, that all unvaccinated persons shall be excluded from the public schools. This law is strictly enforced in many of our municipalities. Its constitutionality has been affirmed by the courts of the State. This has been just recently declared in a notable decision handed down by the Appellate Division of the Supreme Court, so that no question can ever arise as to its legality. The State Department of Health would reaffirm that an unvaccinated person is a menace to the public health; and to have smallpox is a crime against the community.

MONTHLY BULLETIN OF THE NEW YORK STATE

Abstract of deaths and their causes in the following

[Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
MARITIME DISTRICT Totals	4,052,875	5,737	17.3	1,514	26.4	564	105	14	75	8
CITY OF NEW YORK Totals	3,732,903	5,368	17.5	1,438	26.7	590	105	14	69	7
BOROUGH OF MANHATTAN	1,917,676	2,883	18.3	757	26.3	262	95	10	34	3
BOROUGH OF THE BRONX	268,341	365	16.4	81	22 2	43	123	....	1	1
BOROUGH OF BROOKLYN	1,291,597	1,790	16.8	504	28.0	235	115	4	31	2
BOROUGH OF QUEENS	182,681	229	15.0	72	31.0	34	125	....	2	....
BOROUGH OF RICHMOND	72,608	101	17.0	24	24.0	16	150	....	1	1
Oyster Bay	16,334	13	......	4	30.0	2	75	....	....	....
Hempstead	27,066	35	15.7	8	23.0	13	115	....	....	....
North Hempstead	12,018	16	......	3	18.7	1	65	....	....	....
Southold	8,301	10	......	1	10.0	3	200	....	....	....
Sag Harbor	3,500	4	......	1	25.0	2	......	....	....	....
Huntington	9.483	13	......	2	15.4	3	75	....	....	....
Brookhaven	14,592	9	......	0	......	4	......	....	....	....
YONKERS	50,000	58	14.0	17	30.0	6	150	....	3	....
Greenburg	15.564	11	......	2	19 0	3	......	....	....	....
MOUNT VERNON	20,346	24	14.5	4	16.6	3	40	....	....	....
Port Chester	7,440	15	......	4	26.7	1	135	....	1	....
Ossining	7.939	12	......	1	8.3	1	175	....	....	....
NEW ROCHELLE	14.720	19	......	7	40.0	3	55	....	1	....
Peekskill	10,358	14	......	8	57.0	2	215	....	1	....
White Plains	7,900	12	......	0	......	4	......	....	....	....
Rest of District	94,382	104	13.5	14	14.0	23	75	....	....	1
HUDSON VALLEY DIST. Totals	696,000	918	16.0	135	15.0	207	80	2	11	1
ALBANY	100,000	145	17.7	20	13.8	24	40	....	1	....
COHOES	24,000	35	18.2	11	31.5	3	140	....	1	....
TROY	75,057	121	19.5	18	15.0	15	58	....	3	....
WATERVLIET	14,321	19	......	2	10.5	4	105	....	....	....
Green Island	4,770	4	......	1	25.0	0	......	....	....	....
Hoosick Falls	5,671	2	......	1	50.0	1	......	....	....	....
RENSSELAER	7,466	11	......	1	9.0	2	......	....	....	....
Coxsackie	4,102	7	......	0	.....	2	142	....	....	....
Catskill	5,486	5	......	0	......	2	200	....	....	....
HUDSON	9,528	13	......	2	15.3	2	75	....	....	....
KINGSTON	24,535	28	14.0	5	18.0	4	110	....	....	....
Ellenville	3,000	2	......	1	50.0	1	......	....	....	....
Marbletown	3,511	1	......	0	......	1	......	....	....	....
Rosendale	6,278	1	......	0	......	1	......	....	....	....
Esopus	4,907	8	......	1	12.5	0	125	....	1	....
Saugerties	3,700	6	......	0	......	3	......	....	....	....
POUGHKEEPSIE	24,0[illegible]9	33	17.0	4	14.5	9	......	....	....	....
Fishkill	13.016	14	......	4	28.5	3	......	....	....	....
Wappingers Falls	3,504	3	......	0	......	2	......	....	....	....
NEWBURGH	25,000	39	......	6	15.5	9	75	1	....	....
Port Jervis	9,385	13	......	3	23.0	1	165	....	....	....
MIDDLETOWN	14.522	22	......	2	9.0	7	90	....	1	....
Warwick	6,403	6	......	0	......	1	......	....	....	....
Goshen	4,564	9	......	0	......	0	......	....	....	....
Montgomery	5,9[illegible]9	10	......	0	......	2	100	....	1	....
Haverstraw	9,874	12	......	1	8.3	1	80	....	....	1
Nyack	4,275	5	......	0	......	1	......	....	....	....
Ramapo	7,502	14	......	4	28.5	1	285	....	....	....
Rest of District	**271,800**	330	15.0	48	14.7	106	100	1	2	....

districts, cities, villages and towns during November, 1903

villages in *italic* and towns in Roman type.]

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
3	44	41	6	19	200	188	1,115	686	66	215	544	565	482	203	342	88	883
1	43	40	6	17	186	180	1,079	649	64	183	513	517	431	189	315	74	791
....	12	16	5	10	73	106	580	326	40	87	256	311	228	108	207	33	438
....	10	10	....	....	15	8	46	94	5	10	32	26	23	12	8	9	55
1	19	14	1	6	74	53	398	200	15	73	191	150	131	59	76	28	264
....	2	....	....	....	20	5	41	24	3	11	22	21	32	6	13	4	23
....	....	....	....	1	4	8	14	5	1	2	12	9	17	4	11	....	11
....	....	....	....	1	....	....	....	2	....	....	1	1	3	1	1	....	8
....	....	....	....	1	3	....	1	1	1	4	3	5	5	1	7	....	8
....	....	....	....	....	1	....	2	3	....	2	2	3	1	....	2	....	....
....	....	....	....	....	1	1	....	....	....	4	1	1	1	....	....	....	1
....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	2
....	....	....	....	....	1	....	2	....	....	1	....	1	3	....	1	1	3
....	....	....	....	....	....	....	1	....	....	....	2	1	1	....	....	2	2
....	....	....	....	....	4	2	6	2	....	6	5	9	9	3	2	....	7
....	....	....	....	....	....	....	2	1	....	3	....	....	1	....	2	1	1
....	....	....	....	....	1	....	3	2	1	2	2	4	2	1	1	2	3
....	....	1	....	....	....	....	3	1	....	2	1	1	2	1	....	....	2
2	....	....	....	....	....	....	....	1	....	....	1	2	....	....	4	1	1
....	....	....	....	....	....	....	2	2	....	1	....	1	2	....	2	1	7
....	....	....	....	....	2	....	6	....	....	1	1	....	2	1	....	....	....
....	....	....	....	....	....	....	....	3	....	....	1	3	3	....	....	....	2
....	1	....	....	....	1	5	7	19	....	6	10	16	16	6	5	6	5
....	3	3	3	2	19	29	93	106	5	68	94	116	122	46	67	40	88
....	1	1	....	....	3	....	18	21	....	10	24	26	9	14	10	1	6
....	....	....	....	....	....	4	4	7	....	1	3	2	....	2	....	1	10
....	....	....	1	....	3	....	12	23	1	9	14	16	13	5	3	1	17
....	....	1	....	....	....	1	1	3	....	1	1	3	4	2	....	2	....
....	....	....	....	....	....	....	....	1	....	....	1	....	1	1	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1
....	....	....	....	....	....	....	2	1	....	1	....	3	2	1	....	....	1
....	....	....	....	1	....	....	1	1	....	1	1	1	....	....	....	1	....
....	....	....	....	....	....	....	....	....	....	1	....	2	....	....	....	....	1
....	....	....	....	....	....	1	1	1	....	3	2	2	1	....	2	....	....
....	2	....	....	....	1	....	5	3	....	2	2	3	3	1	3	1	2
....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....
....	....	....	....	....	....	....	....	....	....	1	2	....	2	....	1	....	1
....	....	....	....	....	....	....	....	1	....	....	1	....	2	....	1	1	....
....	....	....	....	....	....	....	1	....	....	4	5	5	7	2	5	1	3
....	....	....	....	....	....	....	1	....	....	....	2	1	7	1	....	....	2
....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	1
....	....	....	....	....	2	....	11	3	....	1	2	8	5	1	2	....	3
....	....	....	....	....	2	....	1	1	....	....	3	....	....	....	2	....	4
....	....	....	....	....	....	1	3	1	....	3	....	1	6	....	....	3	3
....	....	....	....	....	....	....	....	1	1	1	2	....	....	....	....	1	....
....	....	....	....	....	....	....	....	1	....	3	....	....	1	....	1	....	3
....	....	....	....	....	....	....	....	2	....	1	2	1	3	....	....	....	....
....	....	....	....	....	....	....	1	1	....	1	1	....	2	....	5	....	....
....	....	....	....	....	....	....	....	....	1	....	1	1	1	....	1	....	....
....	....	....	....	....	4	....	1	....	....	....	1	....	4	....	3	....	1
....	....	1	2	1	4	22	29	34	2	24	23	40	47	16	28	27	27

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
ADIRONDACK AND NORTHERN DISTRICT Totals	395,000	419	13.0	61	14.7	152	115	1	13	....
WATERTOWN	21,700	26	14.4	3	11.5	11	75	....	1	....
Ellisburgh	3,333	2	......	1	50.0	1	500	....	....	....
Cape Vincent	2,332	2	......	0	......	2	......	....	....	....
Clayton	4,313	5	......	1	20.0	3	......	....	....	....
OGDENSBURG	12,633	13	......	1	7.5	3	150	....	1	....
Gouverneur	6,000	8	......	2	25.0	2	250	....	1	....
Potsdam	3,843	9	......	2	22.2	5	220	....	1	....
Canton	6,387	7	......	0	......	3	......	....	....	....
Malone	5,935	11	......	5	45.4	2	270	....	....	....
Plattsburg	8,434	5	......	2	40.0	0	400	....	....	....
Glens Falls	12,613	11	......	1	9.0	4	......	....	....	....
Whitehall	4,377	6	......	2	33.3	2	......	....	....	....
Fort Edward	5,216	4	......	1	25.0	0	......	....	....	....
Sandy Hill	4,473	4	......	0	......	1	250	....	1	....
Granville	5,217	6	......	1	16.6	0	......	....	....	....
Greenwich	4,172	6	......	2	33.3	1	......	....	....	....
Lowville	3,746	9	......	0	......	4	220	....	1	....
Rest of District	279,000	285	13.0	37	13.2	108	107	1	7	....
MOHAWK VALLEY DIST. Totals	430,000	502	14.5	84	16.0	133	66	1	10	....
SCHENECTADY	47,625	47	12.0	13	27.5	8	75	1	....	....
Cobleskill	3,973	2	......	0	......	0	500	....	1	....
AMSTERDAM	20,929	24	14.0	6	25.0	3	165	....	2	....
Fort Plain	2,444	2	......	1	50.0	0	......	....	....	....
JOHNSTOWN	10,130	19	......	1	5.0	7	50	....	....	....
GLOVERSVILLE	18,349	23	15.0	4	17.0	3	45	....	....	....
LITTLE FALLS	10,381	11	......	1	......	1	90	....	1	....
Herkimer	5,555	5	......	0	......	0	......	....	....	....
Ilion	5,138	5	......	0	......	1	......	....	....	....
UTICA	56,383	84	18.0	22	26.2	14	120	....	2	....
Whitestown	6,235	10	......	2	20.0	1	100	....	....	....
ROME	15,343	17	......	1	6.0	6	......	....	....	....
Boonville	3,832	5	......	1	20.0	1	......	....	....	....
Camden	3,745	6	......	0	......	2	......	....	....	....
Waterford	6,157	10	......	1	10.0	2	......	....	....	....
Mechanicville	4,695	5	......	0	......	2	......	....	....	....
Ballston Spa	3,923	1	......	0	......	0	......	....	....	....
Saratoga Springs	12,409	16	......	0	......	4	......	....	....	....
Rest of District	183,250	210	13.0	31	15.0	78	50	....	4	....
SOUTHERN TIER DISTRICT Totals	429,534	467	13.3	64	14.0	131	100	....	9	....
BINGHAMTON	39,647	49	15.0	7	14.0	12	80	....	....	....
Owego	5,039	5	......	2	40.0	1	......	....	....	....
Candor	3,330	3	......	1	33.3	0	333	....	....	....
Waverly	4,465	5	......	0	......	1	......	....	....	....
ELMIRA	35,672	46	15.7	8	17.5	7	240	....	4	....
Horseheads	4,944	2	......	0	......	1	......	....	....	....
HORNELLSVILLE	12,000	17	......	4	25.0	4	150	....	....	....
Bath	5,000	5	......	0	......	3	......	....	....	....
CORNING	11,061	13	......	1	6.0	1	60	....	....	....
Wellsville	5,000	3	......	0	......	0	......	....	....	....
OLEAN	9,462	5	......	3	60.0	0	......	....	....	....
Salamanca	4,251	8	......	2	24.0	1	......	....	....	....
DUNKIRK	11,616	20	......	5	25.0	2	200	....	....	....

FOR NOVEMBER—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	7	....	1	....	9	16	23	38	....	39	26	55	56	16	27	46	46
....	....	....	....	....	1	....	3	3	....	5	2	2	3	2	....	2	2
....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....
....	....	....	....	....	....	....	....	2	....	1	....	1	....	....	....	....	1
....	....	....	....	....	....	1	2	3	....	....	4	....	1	1	....	2	1
....	....	....	....	....	....	1	....	....	....	....	....	1	2	1	....	1	1
....	....	....	....	....	....	1	....	1	....	....	....	2	....	....	1	1	2
....	....	....	....	....	....	....	1	....	....	1	4	....	1	....	....	3	....
....	....	....	....	....	....	3	....	1	....	1	1	....	2	....	1	....	2
....	....	....	....	....	1	1	....	....	....	....	....	1	....	....	1	....	1
....	....	....	....	....	....	....	....	....	....	....	3	2	2	1	....	1	2
....	....	....	....	....	....	....	1	....	....	1	....	....	2	....	1	1	....
....	....	....	....	....	....	....	....	....	....	1	....	1	....	1	....	....	1
...	....	....	....	....	....	....	....	....	....	....	1	2	....	....	....	....	....
....	....	....	....	....	....	....	2	....	....	1	....	....	....	....	3	....	....
....	....	....	....	....	....	....	....	....	....	1	1	1	1	....	....	....	2
....	....	....	....	....	....	1	1	....	....	1	1	....	1	1	....	2	....
....	7	....	1	....	6	8	13	28	....	25	14	41	41	9	20	33	31
....	1	....	1	4	8	8	52	45	4	49	34	65	81	22	24	30	63
....	....	....	....	....	....	2	9	5	1	1	4	7	5	....	2	3	7
....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....
....	....	....	....	....	....	2	2	4	....	2	....	2	5	....	4	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1
....	....	....	....	....	1	....	1	....	1	1	2	5	5	....	1	....	2
...	....	....	....	....	1	....	6	....	....	....	2	2	4	1	....	1	6
....	....	....	....	....	....	....	....	2	....	1	....	2	....	3	....	....	3
....	....	....	....	....	....	....	....	1	....	3	....	....	....	....	1	....	....
....	....	....	....	....	....	....	....	....	....	....	1	1	1	1	....	1	....
....	....	....	1	....	4	3	15	8	....	9	3	9	10	3	2	1	14
....	....	....	....	....	1	....	1	2	....	....	....	3	1	....	....	....	2
....	....	....	....	....	....	....	4	3	....	....	1	3	3	....	....	3	....
....	....	....	....	....	....	....	....	2	....	1	....	....	1	....	....	....	1
....	....	....	....	....	....	....	1	....	....	....	1	....	1	1	....	1	1
....	....	....	....	....	....	....	....	2	....	2	....	1	2	2	1	....	....
....	....	....	....	....	....	....	....	1	....	2	....	....	1	1	....	....	....
....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	2	2	3	3	1	4	1	....
....	1	....	....	4	1	1	12	15	2	25	18	26	39	9	9	19	25
....	6	2	1	6	13	9	54	29	3	44	34	75	61	15	27	35	44
....	....	1	....	1	1	1	6	1	....	3	7	9	8	2	3	3	4
....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	2	....	2
....	....	....	....	1	....	....	1	....	....	....	....	....	1	....	....	....	....
....	....	....	....	....	....	....	....	1	1	....	....	2	....	1	....	....	....
....	....	....	....	2	4	1	4	5	1	2	2	8	6	....	....	2	5
....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....
....	....	....	....	....	8	....	2	1	....	2	1	2	2	....	....	2	2
....	....	....	....	....	....	....	1	....	....	....	1	....	1	....	....	2	....
....	....	1	....	....	....	....	2	2	....	2	1	8	....	1	4	....	2
....	....	....	....	....	....	....	1	....	....	....	1	....	1	....	....	....	....
....	....	....	....	....	....	....	2	....	....	2	1	....	....	....	....	....	....
....	....	....	....	....	....	....	1	1	....	1	....	....	....	2	....	1	2
....	3	....	....	....	....	1	1	2	....	1	1	4	4	....	2	....	1

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
SOUTHERN TIER DISTRICT —(*Continued*)										
JAMESTOWN	22,892	19	10.0	2	10.5	3	200	....	1	....
Westfield	2,430	6	......	1	16.6	3	165	....	....	....
Fredonia	4,125	9	......	0	......	4	110	....	....	....
Rest of District	248,600	247	12.0	28	11.5	38	65	....	4	....
EAST CENTRAL DISTRICT Totals	408,000	494	15.0	54	11.0	160	45	....	11	....
SYRACUSE	108,874	159	16.5	25	11.8	81	13	....	1	....
Baldwinsville	3,000	3	......	0	......	1	......	....	....	....
DeWitt	5,485	14	......	2	14.2	2	415	....	6	....
CORTLAND	9,014	18	......	2	11.1	6	......	....	....	....
Homer	2,881	4	......	0	......	1	......	....	....	....
ONEIDA	7,942	3	......	0	......	4	......	....	....	....
Hamilton	3,744	3	......	0	......	3	......	....	....	....
Cazenovia	3,830	4	......	0	......	0	......	....	....	....
Canastota	3,800	2	......	1	50.0	0	......	....	....	....
Norwich	5,766	10	......	1	10.0	5	......	....	....	....
Oneonta	7,147	13	......	0	......	3	75	....	1	....
Worcester	2,409	3	......	0	......	0	330	....	1	....
Cooperstown	2,368	4	......	0	......	2	......	....	....	....
Walton	4,369	4	......	0	......	1	250	....	....	....
Delhi	3,248	2	......	0	......	2	......	....	....	....
Liberty	4,568	4	......	1	25.0	0	......	....	....	....
Rest of District	225,540	248	12.5	22	9.0	99	45	....	2	....
WEST CENTRAL DISTRICT Totals	320,600	347	13.0	30	9.0	134	60	....	11	....
AUBURN	35,000	40	14.0	3	7.5	18	25	....	....	....
ITHACA	13,136	13	......	1	7.5	7	......	....	....	....
Hector	4,137	6	......	1	16.6	1	165	....	....	....
Waterloo	4,256	8	......	1	12.5	2	......	....	....	....
Seneca Falls	6,519	8	......	0	......	3	......	....	....	....
GENEVA	10,433	7	......	0	......	4	......	....	....	....
Canandaigua	6,151	7	......	1	14.2	4	......	....	....	....
Manchester	4,733	9	......	1	11.0	3	......	....	....	....
Phelps	4,788	6	......	0	......	3	165	....	1	....
Penn Yan	4,650	8	......	1	12.5	4	125	....	1	....
Batavia	9,180	12	......	0	......	3	330	....	3	....
Dansville	3,633	6	......	0	......	2	......	....	....	....
Le Roy	3,144	1	......	0	......	0	......	....	....	....
Warsaw	4,341	1	......	0	......	1	......	....	....	....
Rest of District	206,500	215	12.0	21	11.0	87	50	....	6	....
LAKE ONTARIO AND WESTERN DISTRICT Totals	897,272	1,135	15.2	215	18.0	237	125	5	25	....
BUFFALO	370,000	440	14.7	110	25.0	58	112	4	8	....
Tonawanda	7,421	4	......	0	......	0	......	....	....	....
Vmherst	4,228	3	......	0	......	2	330	....	....	....
NORTH TONAWANDA	9,069	14	......	8	57.0	1	......	....	....	....
LOCKPORT	16,581	26	......	8	30.0	6	300	....	....	....
NIAGARA FALLS	19,457	27	16.7	13	48.0	3	190	....	2	....
Medina	4,716	3	......	2	66.6	1	330	....	....	....
Albion	4,477	6	......	1	16.7	3	165	....	....	....
Brockport	3,400	4	......	1	25.0	1	500	....	1	....
ROCHESTER	162,608	242	18.0	26	11.0	41	165	....	4	....
Palmyra	3,758	......	......	......	......	......	......	....	....	....

FOR NOVEMBER—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	2	1	1	8	1	2	....	1	1	2	2	2	....
....	....	....	....	....	....	1	1	....	....	1	1	....	....	....	2	....	....
....	1	....	....	....	....	....	2	....	....	1	....	....	1	....	....	....	4
....	2	....	1	2	3	4	28	12	....	28	18	45	36	7	12	23	22
....	....	....	1	....	6	4	71	45	2	33	36	72	62	30	29	35	52
....	....	....	....	....	1	....	24	13	....	8	11	19	19	12	7	8	27
....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	3	....	....	2	1	2
....	....	....	....	....	....	....	5	1	....	....	....	3	5	....	1	1	2
....	....	....	....	....	....	....	....	1	....	....	....	....	1	1	....	1	....
....	....	....	....	....	....	....	1	1	1	....	1	2	1	....	....	1	....
....	....	....	....	....	....	....	1	....	....	....	....	....	1	....	....	1	....
....	....	....	....	....	....	....	....	1	....	....	1	2	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
....	....	....	....	....	....	....	1	1	....	....	2	3	1	....	1	....	1
....	....	....	....	....	....	....	....	1	....	2	....	1	2	1	3	2	....
....	....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....	....
....	....	....	....	....	....	....	....	....	....	1	1	1	....	1	....	....	....
....	....	....	1	....	....	....	....	....	....	....	1	....	....	....	....	....	2
....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....
....	....	....	....	....	....	....	1	3	....	....	....	....	....	....	....	....	....
....	....	....	....	....	5	4	33	22	1	27	19	34	29	15	15	20	17
....	....	1	1	1	2	3	40	29	2	34	20	51	45	23	21	37	26
....	....	....	....	....	1	....	2	6	....	2	3	6	9	2	4	2	3
....	....	....	....	....	....	....	3	1	....	2	....	1	1	....	1	2	2
....	....	....	....	....	....	1	....	....	....	3	....	....	....	1	....	1	....
....	....	....	....	....	....	....	4	....	....	1	....	....	....	1	....	....	2
....	....	....	....	....	....	....	....	2	....	2	....	....	1	2	1	....	....
....	....	....	....	....	....	....	3	....	....	....	1	....	1	....	....	1	1
....	....	....	....	....	....	....	....	....	....	2	....	....	1	1	1	2	....
....	....	....	....	....	....	....	2	1	....	1	1	1	2	....	1	....	....
....	....	....	....	....	....	....	2	1	....	1	1	....	....	....	....	....	....
....	....	....	....	....	....	....	1	3	....	1	....	....	....	....	....	2	....
....	....	....	....	....	1	....	1	1	....	....	....	4	....	....	1	1	....
....	....	....	....	....	....	....	....	....	....	....	1	3	....	1	....	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....
....	....	1	1	1	....	2	23	14	2	19	13	36	29	15	12	25	17
....	3	1	3	5	66	31	125	98	9	79	76	125	147	60	75	70	123
....	1	1	2	....	18	15	58	36	6	26	31	44	56	22	41	22	49
....	....	....	....	....	....	....	....	1	....	2	....	....	....	....	1	....	....
....	....	....	....	....	1	....	....	....	....	....	....	....	1	....	....	1	....
....	....	....	....	....	....	....	....	1	....	....	1	1	7	....	1	....	3
....	....	....	....	1	7	....	2	3	....	2	2	....	2	1	....	3	3
....	1	....	....	....	1	1	2	....	....	2	....	2	2	1	2	2	9
....	....	....	....	....	....	1	....	....	....	1	....	....	1	....	....	....	....
....	....	....	....	1	....	....	....	1	....	....	....	....	3	....	....	1	....
....	....	....	....	....	....	1	....	1	....	....	....	1	....	....	....	....	....
....	1	....	....	1	26	7	24	23	1	10	16	31	31	19	9	14	25
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
LAKE ONTARIO AND WESTERN DIST.—*Con.*										
Newark	4,578	8	.....	1	12.5	0	.....	....	....	....
Lyons	5,824	5	.....	0	.....	1	.....	....	....	....
Clyde	2,507	4	.....	0	.....	1	250	....	....	....
OSWEGO	22,200	27	.....	2	7.5	8	110	....	....	....
FULTON	8,734	13	.....	3	23.0	6	175	....	2	....
Richland	3,535	2	.....	0	.....	1	.....	....	....	....
Rest of District	244,184	297	14.6	41	14.0	109	93	1	8	....
Totals for the State	7,614,281	10,009	16.0	2,157	21.7	1,714	100	23	165	9
Average for past 5 years	....	8,870	15.0	2,104	23.7	1,631	100	31	189	2

REMARKS—In all parts of the State the rainfall was deficient, especially on the seaboard and the lake region, amounting to half the normal, being in this respect in marked contrast with the month of October. The average for the State of mean lowest rainfalls in November for thirty years is 1.07 inches, while that of mean highest is 6.70, that for the present month being 1.57 inches. At the various stations there were reported from 6 to 12 days on which .01 inch of rain fell, the Eastern part of the State having the fewest, and reporting half the days

FOR NOVEMBER—(*Concluded*)

Zymotic Diseases							Other Causes of Death										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	......	1	3	....	1	....	1	2	....	......	....	......
....	....	....	....	....	....	......	1	......	....	1	....	......	......	1	1	1	......
....	....	....	....	....	....	1	......	1	....	......	....	1	1	....	......	....	......
....	....	....	....	....	3	......	5	2	....	3	....	2	3	2	1	2	4
....	....	....	....	....	....	......	2	......	....	1	1	2	2	....	......	2	1
....	....	....	....	....	....	......	......	......	....	......	....	......	......	1	......	1	......
....	....	....	1	2	10	5	30	26	2	30	25	40	36	13	19	21	28
3	64	48	17	37	323	288	1,573	1,076	91	566	864	1,124	1,056	415	612	381	1,274
6	53	39	14	46	286	216	1,253	1,020	63	608	740	903	982	394	486	400	1,118

of the month as clear. The month was cold, having at all points a temperature 3° below the average, or 37° against 40°. Highest temperatures of nearly 70° occurred on the 4th, and lowest of 14° from the 26th to the 27th. The average of mean lowest temperatures in thirty years in November is 32°. Winds were more northerly than last month, with moderate movement, New York reporting a maximum velocity of 59 miles per hour and Buffalo 62, the rest of the State having a highest of 32 miles.

MONTHLY BULLETIN OF THE NEW YORK STATE

Abstract of deaths and their causes in the following

—Cities are printed in SMALL CAPITALS,

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
MARITIME DISTRICT Totals	4,052,875	6,321	18.3	1,293	20.5	744	115	23	65	7
CITY OF NEW YORK Totals	3,732,903	5,914	18.6	1,206	20.0	659	115	21	59	6
BOROUGH OF MANHATTAN	1,917,676	3,145	19.4	858	27.3	305	110	13	31	1
BOROUGH OF THE BRONX	268,341	476	21.0	110	23.0	47	140	3	3	....
BOROUGH OF BROOKLYN	1,291,597	1,988	18.1	498	25.0	273	100	5	25	5
BOROUGH OF QUEENS	182,681	202	13.0	118	60.0	12	450	....	....	....
BOROUGH OF RICHMOND	72,608	103	16.7	22	22.0	22	70	....	....	....
Oyster Bay	16,334	36	......	6	16.6	7	83	1	....	....
Hempstead	27,066	26	......	2	8.0	5	80	....	1	....
North Hempstead	12,048	19	......	4	21.0	5	50	....	1	....
Southold	8,301	5	......	2	40.0	1	......	....	....	....
Sag Harbor	3,500	5	......	0	......	1	......	....	....	....
Huntington	9,483	6	......	0	......	2	......	....	....	....
Brookhaven	14,592	12	......	2	16.7	2	......	....	....	....
YONKERS	50,000	71	16.7	25	36.7	10	100	1	1	....
Greenburgh	15,564	9	......	2	22.2	2	220	....	1	....
MOUNT VERNON	20,346	26	15.0	5	19.2	3	77	....	....	....
Port Chester	7,440	18	......	5	......	4	......	....	1	....
Ossining	7,939	13	......	1	15.5	6	......	....	....	....
NEW ROCHELLE	14,720	12	......	2	16.6	2	80	....	1	....
Peekskill	10,358	13	......	2	15.3	2	150	....	....	1
White Plains	7,900	7	......	1	14.2	2	......	....	....	....
Rest of District	95,000	129	15.7	22	17.5	31	35	....	....	....
HUDSON VALLEY DISTRICT Totals	696,000	1,083	18.5	151	14.0	285	60	2	17	2
ALBANY	100,000	142	16.8	15	10.6	24	35	....	3	....
COHOES	24,000	38	18.6	9	23.6	2	110	1	1	....
TROY	75,057	120	18.8	15	12.5	26	40	....	2	....
WATERVLIET	14,321	24	......	6	25.0	4	80	....	1	....
Green Island	4,770	12	......	2	16.6	1	166	1	....	....
Hoosick Falls	5,671	4	......	1	25.0	0	......	....	....	....
RENSSELAER	7,466	13	......	2	15.5	4	......	....	....	....
Coxsackie	4,102	8	......	0	......	4	......	....	....	....
Catskill	5,486	8	......	3	37.5	1	......	....	....	....
HUDSON	9,528	23	......	4	17.4	6	......	....	....	....
KINGSTON	24,535	37	17.8	3	9.0	8	50	....	....	....
Ellenville	3,000	1	......	0	......	0	......	....	....	....
Marbletown	3,511	2	......	0	......	0	......	....	....	....
Rosendale	6,278	4	......	0	......	1	......	....	....	....
Esopus	4,907	8	......	0	......	3	125	....	....	....
Saugerties	3,700	4	......	0	......	2	......	....	....	....
POUGHKEEPSIE	24,029	63	30.0	14	22.2	15	80	....	3	....
Fishkill	13,016	26	......	4	15.2	9	75	....	1	....
Wappingers Falls	3,504	6	......	2	33.3	3	......	....	....	....
NEWBURG	25,000	57	26.7	9	15.8	14	35	....	1	....
Port Jervis	9,385	22	......	4	17.2	7	45	....	1	....
MIDDLETOWN	14,522	20	......	2	10.0	7	......	....	....	....
Warwick	6,403	6	......	2	33.3	2	166	....	....	....
Goshen	4,564	8	......	2	25.0	7	125	....	....	....
Montgomery	5,939	11	......	3	27.3	0	......	....	....	....
Haverstraw	9,874	11	......	1	9.0	3	......	....	....	....
Nyack	4,275	4	......	0	......	1	......	....	....	....
Ramapo	7,502	17	......	5	30.0	3	60	....	1	....
Rest of District	271,800	384	16.8	42	11.0	127	40	....	3	2

DEPARTMENT OF HEALTH — VOLUME XIX

districts, cities, villages and towns during December, 1903

villages in *italic* and towns in Roman type.]

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
1	77	43	27	24	222	227	1,389	755	55	235	559	565	507	245	322	92	881
1	77	42	23	24	216	222	1,328	712	54	202	515	524	441	229	298	77	843
....	23	17	10	8	114	103	758	348	26	101	255	277	235	147	173	30	475
....	24	5	4	2	19	9	84	125	1	10	46	18	31	11	24	4	53
1	30	12	9	4	75	39	440	230	27	77	193	201	154	59	89	36	277
....	....	7	....	9	6	68	17	......	....	10	15	16	17	6	5	4	22
....	....	1	....	1	2	3	29	9	....	4	6	12	4	6	7	3	16
....	....	....	....	....	2	......	5	4	....	3	1	3	5	3	2	2	5
....	....	....	....	....	1	......	2	3	....	3	4	6	4	....	......	....	2
....	....	....	....	....	....	......	5	2	....	......	2	2	2	....	2	1	2
....	....	....	....	....	....	......	1	1	....	......	....	......	......	1	......	....	2
....	....	....	....	....	....	......	......	......	....	......	1	......	2	....	......	1	......
....	....	....	....	....	....	......	1	1	....	......	1	......	......	....	......	2	1
....	....	....	....	....	....	......	3	1	....	......	....	1	4	....	2	....	1
....	....	....	1	....	2	2	12	15	....	6	8	4	7	1	4	....	7
....	....	....	....	....	1	......	......	1	....	......	1	3	......	....	1	....	1
....	....	....	....	....	....	2	6	2	....	2	2	3	4	....	2	2	1
....	....	....	....	....	....	......	5	1	....	3	3	......	5	....	......	....	......
....	....	....	....	....	....	......	1	......	....	2	3	1	......	1	2	1	2
....	....	....	....	....	....	......	5	......	....	2	....	......	1	....	1	1	1
....	....	....	....	....	....	1	......	3	....	1	2	......	1	2	......	1	1
....	....	....	....	....	....	......	1	......	....	1	....	1	3	1	1	....	......
....	....	1	3	....	....	......	14	9	1	10	16	17	28	7	7	4	12
....	7	4	1	4	11	4	167	126	3	70	81	156	165	60	56	52	95
....	....	....	....	....	2	......	23	12	....	11	21	30	11	11	4	9	5
....	1	....	....	....	1	......	6	7	....	6	....	5	3	3	2	....	2
....	....	....	1	....	2	......	18	20	2	8	7	17	12	3	6	7	15
....	....	1	....	....	....	......	3	3	....	1	1	2	6	2	......	1	3
....	....	....	....	....	1	......	1	1	....	1	....	3	2	1	......	....	1
....	....	....	....	....	....	......	......	......	....	......	....	1	1	1	......	....	1
....	....	....	....	....	....	......	4	1	....	......	1	1	1	1	2	1	1
....	....	....	....	....	....	......	2	1	....	......	....	2	1	....	......	....	2
....	....	....	....	....	....	......	4	1	....	1	....	......	3	....	......	....	......
....	....	....	....	....	....	......	......	5	....	1	3	4	2	....	2	1	5
....	1	....	....	....	....	1	4	7	....	3	4	2	6	2	2	3	2
....	....	....	....	....	....	......	......	......	....	......	....	1	......	....	......	....	......
....	....	....	....	....	....	......	......	......	....	......	....	......	......	2	......	....	......
....	....	....	....	....	....	......	......	1	....	......	....	......	1	2	......	....	......
....	1	....	....	....	....	......	......	......	....	......	1	2	3	....	......	....	1
....	....	....	....	....	....	......	......	......	....	......	1	1	2	....	......	....	......
....	....	2	....	....	....	......	11	6	....	3	2	8	10	3	5	2	3
....	....	....	....	....	....	1	3	3	....	3	3	......	3	....	5	2	2
....	....	....	....	....	....	......	2	......	....	1	....	1	1	....	1	....	......
....	....	....	....	....	1	......	12	10	....	2	5	7	7	2	3	4	3
....	....	....	....	....	....	......	3	5	....	......	2	2	3	1	1	1	3
....	....	....	....	....	....	......	2	1	....	2	1	3	5	2	2	1	1
....	....	....	....	1	....	......	......	2	....	......	....	1	2	....	......	....	......
....	....	....	....	1	....	......	2	......	....	......	1	......	3	....	......	....	3
....	....	....	....	....	....	......	2	3	....	......	....	1	3	....	......	....	3
....	....	....	....	....	....	......	2	1	....	1	....	2	3	....	1	....	1
....	....	....	....	....	....	......	......	......	....	1	1	......	1	....	1	....	......
....	....	....	....	....	....	......	4	......	....	2	2	2	2	....	1	....	3
....	4	1	....	2	4	2	59	36	1	23	25	58	69	24	18	20	33

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
ADIRONDACK AND NORTHERN DISTRICT										
Totals	395,000	448	13.5	76	16.5	137	80	3	11	....
WATERTOWN	21,700	27	14.6	10	36.5	4	145	1	1	....
Ellisburgh	3,888	5	......	0	......	3	......	....	....	....
Cape Vincent	2,882	5	......	1	......	3	......	....	....	....
Clayton	4,313	3	......	0	......	2	......	....	....	....
OGDENSBURG	12,633	28	......	8	28.5	4	170	1	....	....
Gouverneur	6,000	10	......	1	10.0	1	......	....	....	....
Potsdam	3,843	2	......	0	......	1	......	....	....	....
Canton	6,387	6	......	1	16.6	2	......	....	....	....
Malone	5,935	6	......	1	16.6	2	......	....	....	....
Plattsburg	8,434	10	......	2	20.0	2	200	1	1	....
Glens Falls	12,613	20	......	2	10.0	2	150	....	2	....
Whitehall	4,377	......	......	......	......	......	......	....	....	....
Fort Edward	5,216	4	......	2	50.0	0	......	....	....	....
Sandy Hill	4,473	4	......	1	25.0	3	......	....	....	....
Granville	5,217	9	......	0	......	3	......	....	....	....
Greenwich	4,172	5	......	2	40.0	0	400	....	2	....
Lowville	3,746	8	......	0	......	5	......	....	....	....
Rest of District	279,000	296	16.5	45	12.5	100	75	....	5	....
MOHAWK VALLEY DISTRICT										
Totals	420,000	534	15.0	88	16.5	172	55	2	6	....
SCHENECTADY	47,625	71	......	19	......	14	......	....	1	....
Cobleskill	3,973	6	......	0	......	1	......	....	....	....
AMSTERDAM	20,929	17	10.0	3	17.5	8	115	....	2	....
Fort Plain	2,444	5	......	0	......	2	......	....	....	....
JOHNSTOWN	10,130	17	......	8	47.0	3	25	....	....	....
GLOVERSVILLE	18,349	25	......	2	8.0	7	40	....	1	....
LITTLE FALLS	10,881	......	......	......	......	......	......	....	....	....
Herkimer	5,555	11	......	1	9.0	2	......	....	....	....
Ilion	5,138	3	......	1	33.3	0	......	....	....	....
UTICA	56,383	102	21.0	16	16.0	24	80	....	....	....
Whitestown	6,235	5	......	0	......	2	......	....	....	....
ROME	15,343	19	......	3	15.5	10	100	....	....	....
Boonville	3,332	5	......	0	......	3	......	....	....	....
Camden	3,745	4	......	0	......	4	......	....	....	....
Waterford	6,157	8	......	1	12.5	0	......	....	....	....
Mechanicville	4,695	3	......	1	33.3	0	......	....	....	....
Ballston Spa	3,933	1	......	0	......	0	......	....	....	....
Saratoga Springs	12,409	16	......	6	37.5	1	65	....	....	....
Rest of District	188,170	216	13.2	27	13.0	96	85	2	2	....
SOUTHERN TIER DISTRICT										
Totals	429,434	545	15.0	77	14.0	180	55	2	7	....
BINGHAMTON	39,647	63	18.5	11	17.5	14	15	....	....	....
Owego	5,039	4	......	0	......	2	......	....	....	....
Candor	3,330	5	......	2	40.0	1	200	....	....	....
Waverly	4,465	5	......	1	20.0	1	......	....	....	....
ELMIRA	35,672	46	......	6	18.0	14	60	....	2	....
Horseheads	4,944	9	15.2	0	......	4	110	....	1	....
HORNELLSVILLE	12,000	20	......	5	25.0	4	100	....	....	....
Bath	5,000	......	......	......	......	......	......	....	....	....
CORNING	11,061	14	......	3	21.4	1	......	....	....	....
Wellsville	5,000	6	......	0	......	0	......	....	....	....
OLEAN	9,462	13	......	0	......	2	70	....	1	....
Salamanca	4,251	7	......	2	28.0	0	142	....	....	....
DUNKIRK	11,616	30	......	13	43.3	6	230	....	1	....

FOR DECEMBER—(*Continued*)

ZYMOTIC DISEASES										OTHER CAUSES OF DEATH							
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
1	2	1	6	....	7	7	46	35	1	36	36	66	68	18	19	32	53
....	....	....	1	....	1	......	1	2	....	4	1	3	5	1	1	....	5
....	....	....	....	....	....	......	......	......	....	......	....	1	3	....	1	....	......
....	....	....	....	....	....	......	......	......	....	......	....	1	......	....	......	1	3
....	....	....	....	....	....	......	1	1	....	......	....	......	......	....	1	....	......
....	....	....	....	....	....	4	2	3	....	2	5	3	1	3	1	1	2
....	....	....	....	....	....	......	......	1	....	2	....	1	2	1	1	....	2
....	....	....	....	....	....	......	......	1	....	......	....	......	......	....	......	1	......
....	....	....	....	....	....	......	2	......	....	1	....	1	1	....	......	....	1
....	....	....	....	....	....	......	......	1	....	......	....	1	1	....	......	2	1
....	....	....	....	....	....	......	2	3	....	......	....	2	......	....	......	....	1
....	....	....	....	....	1	......	2	1	....	1	3	1	3	3	......	1	2
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	......
....	....	....	....	....	....	......	......	......	....	......	1	......	......	....	1	....	2
....	....	....	....	....	....	......	1	......	....		1		......	1	......	....	1
....	....	....	....	....	....	......	......	......	....	2	1	1	1	1	......	1	2
....	....	....	....	....	....	......	1	......	....	1	....	......	1	....	......	....	......
....	....	....	....	....	....	......	1	......	....	1	....	1	3	1	......	....	1
1	2	1	5	....	5	3	33	22	1	22	24	50	47	7	13	25	30
....	2	....	1	2	12	3	69	49	2	40	39	74	75	22	30	36	70
....	1	....	....	....	1	1	13	10	....	5	3	6	11	2	6	2	9
....	....	....	....	....	....	......	......	1	1	1	1	1	1	....	......	....	......
....	....	....	....	....	....	......	2	2	....	......	1	3	3	....	1	1	2
....	....	....	....	....	....	......	......	......	....	......	1	......	......	1	......	2	1
....	....	....	....	2	....	......	1	3	....	1	2	......	3	....	1	....	4
....	....	....	....	....	....	......	1	2	....	5	3	5	2	2	......	2	2
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	......
....	....	....	....	....	....	......	1	3	....	1	1	2	1	1	......	....	1
....	....	....	....	....	....	......	......	......	....	......	1	......	......	....	......	....	2
....	....	....	1	....	6	1	19	8	....	6	6	19	11	3	6	3	13
....	....	....	....	....	....	......	......	......	....	1	....	......	2	1	1	....	......
....	1	....	....	....	1	......	3	......	....	......	....	3	1	1	2	2	5
....	....	....	....	....	....	......	......	......	....	......	1	3	1	....	......	....	......
....	....	....	....	....	....	......	......	1	....	......	....	1	1	....	......	1	......
....	....	....	....	....	....	......	......	3	....	1	1	1	2	....	......	....	......
....	....	....	....	....	....	......	......	1	....	1	....	......	......	....	......	....	1
....	....	....	....	....	....	......	......	1	....	......	....	......	......	....	......	....	......
....	....	....	....	....	1	......	3	......	....	3	1	1	5	....	......	....	2
....	....	....	....	....	3	1	26	14	1	15	17	29	31	11	13	23	28
....	3	1	2	4	7	3	76	38	4	40	32	97	64	29	31	47	58
....	....	....	1	....	....	......	15	5	2	6	....	9	6	5	7	4	3
....	....	....	....	....	....	......	......	......	....	......	....	1	......	....	......	2	1
....	....	....	....	....	1	......	2	......	....	......	1	......	......	....	......	....	1
....	....	....	....	....	....	......	......	......	....	......	....	1	......	....	1	1	2
....	....	....	....	....	....	......	3	4	....	4	6	9	5	1	3	3	1
....	....	....	....	....	....	......	2	1	....	......	....	2	2	....	......	1	......
....	....	....	....	....	2	......	3	......	....	1	....	3	1	2	......	1	7
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	......
....	....	....	....	....	....	......	4	1	....	2	1	......	1	....	2	1	2
....	....	....	....	....	....	......	1	1	....	1	....	1	2	....	......	....	......
....	....	....	....	....	....	......	1	1	....	......	2	4	......	....	1	2	1
....	....	....	....	1	....	......	......	1	....	......	....	......	......	....	1	....	4
....	1	....	....	3	1	1	2	2	....	4	2	2	4	1	2	....	4

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
SOUTHERN TIER DISTRICT —*Continued*										
JAMESTOWN	22,892	32	16.8	7	21.5	10	......	....	....	....
Westfield	2,430	3	......	1	......	......	......	....	....	....
Fredonia	4,125	8	......	1	12.5	2	......	....	....	....
Rest of District	248,500	280	13.0	25	9.0	119	40	2	2	....
EAST CENTRAL DISTRICT Totals	401,082	488	14.0	46	9.0	181	25	1	3	....
SYRACUSE	108,374	131	14.5	16	12.5	29	50	1	3	....
Baldwinsville	3,000	......	......	......	......	......	......	....	....	....
DeWitt	5,435	7	......	2	28.5	3	......	....	....	....
CORTLAND	9,014	11	......	3	27.3	3	......	....	....	....
Homer	2,381	3	......	0	......	1	......	....	....	....
ONEIDA	7,942	8	......	1	12.5	2	......	....	....	....
Hamilton	3,744	7	......	0	......	5	......	....	....	....
Cazenovia	3,380	4	......	1	25.0	2	......	....	....	....
CANASTOTA	3,300	5	......	0	......	1	......	....	....	....
Norwich	5,766	3	......	1	33.3	0	......	....	....	....
Oneonta	7,147	4	......	0	......	1	......	....	....	....
Worcester	2,409	2	......	0	......	1	500	....	....	....
Cooperstown	2,368	2	......	0	......	2	......	....	....	....
Walton	4,869	5	......	0	......	2	......	....	....	....
Delhi	3,243	3	......	0	......	1	......	....	....	....
Liberty	4,568	11	......	0	......	0	100	....	....	....
Rest of District	225,540	282	14.0	22	8.5	128	25	....	....	....
WEST CENTRAL DISTRICT Totals	320,600	432	15.6	38	8.5	159	45	....	5	....
AUBURN	35,000	42	14.0	3	8.0	6	120	....	1	....
ITHACA	13,136	26	......	3	11.5	8	115	....	1	....
Hector	4,137	3	......	0	......	2	......	....	....	....
Waterloo	4,256	4	......	1	25.0	1	......	....	....	....
Seneca Falls	6,519	16	......	1	6.2	7	......	....	....	....
GENEVA	10,433	15	......	3	20.0	3	75	....	1	....
Canandaigua	6,151	18	......	3	16.6	5	......	....	....	....
Manchester	4,733	3	......	1	33.3	0	......	....	....	....
Phelps	4,788	2	......	0	......	1	......	....	....	....
Penn Yan	4,650	9	......	0	......	2	......	....	....	....
Batavia	9,180	7	......	1	14.2	3	......	....	....	....
Dansville	3,633	7	......	0	......	5	......	....	....	....
Le Roy	3,144	2	......	0	......	2	......	....	....	....
Warsaw	4,341	3	......	0	......	1	......	....	....	....
Rest of District	206,500	275	15.0	22	7.5	113	35	....	2	....
LAKE ONTARIO AND WESTERN DISTRICT Totals	897,272	1,224	16.0	240	18.5	316	110	8	23	....
BUFFALO	370,000	468	15.0	117	25.0	82	120	7	10	....
Tonawanda	7,421	8	......	2	25.0	1	125	....	....	....
Amherst	4,223	5	......	1	25.0	2	250	....	....	....
NORTH TONAWANDA	9,069	4	......	3	75.0	1	......	....	....	....
LOCKPORT	16,581	26	......	3	11.5	7	75	....	1	....
NIAGARA FALLS	19,457	33	19.8	8	24.2	7	60	....	1	....
Medina	4,716	5	......	0	......	3	......	....	....	....
Albion	4,477	11	......	2	18.2	5	90	....	....	....
Brockport	3,400	8	......	1	12.5	2	125	....	....	....
ROCHESTER	162,608	251	......	43	......	57	......	....	1	....
Palmyra	3,758	7	......	1	14.2	1	......	....	....	....

FOR DECEMBER—(*Continued*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	......	5	2	....	......	1	7	7	2	2	2	4
....	....	....	....	....	....	......	1	......	....	......	....	2	......	....	......	....	......
....	....	....	....	....	....	......	1	1	....	......	....	2	2	1	......	....	1
....	2	1	1	....	3	2	31	19	2	22	19	54	34	17	12	30	27
....	....	....	....	3	5	1	70	35	4	39	38	33	57	29	29	43	48
....	....	....	....	....	2	......	21	8	....	10	11	25	21	7	7	7	8
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	......
....	....	....	....	....	....	......	2	......	....	......	....	......	1	1	1	1	1
....	....	....	....	....	....	......	1	2	....	2	1	3	......	1	......	....	1
....	....	....	....	....	....	......	......	......	....	1	....	2	......	....	......	....	......
....	....	....	....	....	....	......	4	......	....	1	1	......	1	....	......	1	......
....	....	....	....	....	....	......	......	......	....	......	....	5	1	....	......	....	1
....	....	....	....	....	....	......	1	......	....	......	....	......	1	2	......	....	......
....	....	....	....	....	....	......	......	......	....	......	....	4	......	....	1	....	......
....	....	....	....	....	....	......	1	......	....	......	2	......	......	....	......	....	......
....	....	....	....	....	....	......	......	......	....	1	1	......	1	....	......	1	......
....	....	....	....	....	1	......	......	......	....	......	....	......	......	....	......	1	......
....	....	....	....	....	....	......	......	......	....	......	....	1	1	....	......	....	......
....	....	....	....	....	....	......	1	......	....	......	1	......	3	....	......	....	......
....	....	....	....	....	....	......	1	1	....	......	....	......	......	....	......	1	......
....	....	....	....	....	1	......	......	5	1	2	....	1	1	....	......	....	......
....	....	....	....	3	1	1	38	19	3	23	21	42	26	18	20	31	37
....	....	....	5	1	5	3	66	27	2	27	31	65	73	28	24	34	36
....	....	....	....	....	3	1	4	2	....	4	1	5	6	7	3	2	3
....	....	....	....	....	1	1	5	2	....	1	3	2	3	1	......	1	5
....	....	....	....	....	....	......	1	......	....	......	....	1	......	....	......	1	......
....	....	....	....	....	....	......	......	1	....	......	1	1	......	....	......	....	1
....	....	....	....	....	....	......	3	......	....	3	....	3	2	3	2	....	......
....	....	....	....	....	....	......	2	2	....	3	1	2	1	....	......	....	3
....	....	....	....	....	....	......	3	......	....	......	....	4	3	1	......	3	4
....	....	....	....	....	....	......	......	......	....	2	....	......	......	....	1	....	......
....	....	....	....	....	....	......	......	......	....	......	....	1	1	....	......	....	......
....	....	....	....	....	....	......	3	2	....	1	....	1	......	1	1	....	......
....	....	....	....	....	....	......	1	......	....	......	....	......	3	1	......	2	......
....	....	....	....	....	....	......	1	......	....	......	....	4	1	....	......	1	......
....	....	....	....	....	....	......	......	1	....	......	1	......	......	....	......	....	......
....	....	....	....	....	....	......	......	1	....	1	....	1	......	....	......	....	......
....	....	....	5	1	1	1	43	16	2	12	24	40	53	14	17	24	20
....	12	1	2	2	45	31	168	87	13	95	98	144	173	47	84	64	127
....	5	....	....	....	14	21	73	34	7	33	38	40	64	22	42	14	46
....	....	....	....	....	1	......	1	3	....	1	....	......	......	....	......	....	2
....	....	....	....	....	1	......	1	......	....	......	....	3	......	....	......	....	......
....	....	....	....	....	....	......	1	......	....	......	....	......	......	....	......	....	3
....	....	....	....	....	1	......	3	2	....	1	1	1	7	2	4	3	......
....	1	....	....	....	....	......	5	4	....	3	4	......	6	3	2	1	3
....	....	....	....	....	....	......	......	1	....	......	1	......	1	....	......	1	1
....	....	....	....	....	1	......	1	2	....	......	2	1	......	....	......	2	1
....	....	....	....	....	1	......	......	1	....	1	2	......	......	1	2	....	......
....	3	1	....	1	22	3	26	19	4	30	30	27	33	5	8	6	22
....	....	....	....	....	....	......	......	2	....	......	....	1	1	....	......	....	3

SANITARY DISTRICTS	Population	Total number of deaths	Representing annual death rate per 1,000 population of—	Deaths under five years	Percentage of deaths under five years to total deaths	Deaths at 70 years and over	Zymotic deaths per 1,000 deaths from all causes	Cerebro-spinal meningitis	Typhoid fever	Malarial diseases
LAKE ONTARIO AND WESTERN DIST.—*Con.*										
Newark	4,578	8	......	0	......	5	......	....	....	....
Lyons	5,824	8	......	2	25.0	0	250	....	....	....
Clyde	2,507	4	......	1	25.0	1	......	....	....	....
OSWEGO	22,200	35	18.5	3	8.5	9	57	....	2	....
FULTON	8,784	10	......	0	......	2	200	....	2	....
Richland	3,535	2	......	1	50.0	0	500	....	1	....
Rest of District	244,184	331	15.0	52	15.5	131	70	1	5	....
Totals for the State	7,614,281	11,075	17.0	2,009	18.2	2,174	90	41	137	9
Average for past 5 years	....	10,267	17.0	2,409	23.5	1,906	93	34	184	17

THE PRINCIPAL CAUSES OF DEATH FOR THE YEAR.—There have been reported during the year, including 578 delayed returns received after the issue of the Monthly Bulletin, 127,100 deaths during the year, which makes a mortality per 1,000 population of 16.7. While the total mortality is about 3,000 greater than that of last year, the estimated increase in population reduces the death rate from that of 17.0 per 1,000. The increase occurred for the most part in the cold weather months, but the deaths of July were a little greater than last year, which was unusually low; it is however below the average of the midsummer month. The November mortality was on the other hand unusually high, for while this month has usually the lowest mortality of any in the year, it was this year one thousand greater than in 1902, and exceeded the reported mortality of September and October. The increase was chiefly in acute respiratory and other local diseases.

The *infant mortality* exceeded that of 1902 by 1,500, but it was exceptionally low last year, and it is still 4,000 less than the average. In some years there have been 10,000 more deaths under five years of age than were reported this year. The 22,000 at age of seventy

FOR DECEMBER—(*Concluded*)

ZYMOTIC DISEASES							OTHER CAUSES OF DEATH										
Smallpox	Scarlet fever	Measles	Erysipelas	Whooping cough	Croup and diphtheria	Diarrheal diseases (acute)	Acute respiratory diseases	Consumption (pulmonary)	Puerperal diseases	Diseases of digestive system (not acute diarrheal)	Diseases of urinary system	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age	Unclassified
....	....	....	....	....	....	......	2	1	....	1	2	1	1	....	......	....	......
....	....	....	....	....	....	2	......	1	....	......	....	2	1	....	2	....	......
....	....	....	....	....	....	......	......	1	....	......	....	1	1	....	......	....	1
....	....	....	....	....	....	......	5	4	....	5	....	8	5	2	2	2	......
....	....	....	....	....	....	......	......	......	....	......	1	1	4	1	......	1	......
....	....	....	....	....	....	......	......	......	....	......	....	......	......	....	......	....	1
....	5	....	2	1	4	5	40	12	2	20	17	58	49	10	22	34	44
2	103	50	44	40	314	279	2,051	1,152	84	582	914	1,250	1,182	478	595	400	1,368
14	69	74	27	58	318	164	1,835	1,086	81	643	829	1,048	1,132	426	489	474	1,265

and over constitute the same percentage of the entire mortality as in 1902, 17 per cent of all deaths.

Zymotic diseases caused one-eighth of the mortality of the year, against 14.0 per cent last year, and is as low as has ever appeared in past years, the range having been from 12.0 to 22.0 per cent of all deaths.

Smallpox caused 41 deaths, all but 16 occurring in and about Rochester. Most of the deaths occurred in the first half of the year. After general quiescence during the summer it recurred in the fall pretty widely, the chief centres being at the end of the year in Chautauqua and Cattaraugus counties, where it has been very general for a long time; in Orleans, Niagara and Wayne counties and in the region about northern Saratoga county. Limited outbreaks have occurred in numerous other localities. The Southern Tier, East and West Central districts have alone been free from fatalities from smallpox.

There were 10,250 deaths from *pneumonia* and 7,960 from Bright's disease. The acute respiratory mortality was about the average. *Grippe* is estimated to have caused 8,000 deaths, and its annual recurrence is apparent during the closing weeks of the year.

RELATIVE AREA, DENSITY OF POPULATION AND DEATH RATES IN THE SANITARY DISTRICTS FOR THE YEAR 1903

DISTRICTS	Area in square miles	Population per square mile	Urban death rate*	Rural death rate†	Total death rate	PERCENTAGE OF DEATHS— Under 5 years of age	At 70 years of age and over	From zymotic diseases	IN EACH 1,000 DEATHS FROM ALL CAUSES THERE WERE FROM— Typhoid fever	Scarlet fever	Diphtheria and croup	Diarrheal diseases	Consumption	Pneumonia	Bright's disease
Martiime	2,286	1,778	18.0	17.8	17.9	32.0	10.5	14.5	10	10	81	75	117	89.0	67.2
Hudson Valley	5,872	118	18.4	15.0	16.5	19.2	23.4	9.0	14	7	12	85	100	70.0	57.3
Adirondack and Northern	15,060	26	16.5	18.4	18.5	17.0	23.7	9.0	21	4	10	88	93	57.4	40.0
Mohawk Valley	4,731	89	18.0	18.5	15.0	20.7	26.6	10.0	16	11	16	85	90	63.5	53.1
Southern Tier	6,545	66	14.5	18.5	14.0	12.5	31.0	8.5	20	5	14	85	65	54.5	40.0
East Central	6,555	63	14.6	14.8	14.5	15.5	32.0	7.0	14	2	9	28	80	63.5	43.5
West Central	4,746	66	15.0	15.0	15.0	9.0	35.0	7.5	24	1	8	26	75	60.0	34.5
Lake Ontario and Western	4.378	200	15.5	14.5	15.0	23.5	22.5	12.8	21	6	23	50	80	51.0	40.5
Entire State	50,200	157	17.8	14.0	16.5	26.4	17.8	12.5	14	8	24	60	120	79.5	60.0

* Namely in cities of 20,000 population and over.

† In towns and places of less than 20,000 population.

THE SANITARY DISTRICTS into which the State is divided are as follows: *Maritime District:* includes New York, Brooklyn, Long Isand, Staten Island and Westchester county. *Hudson Valley District:* All the counties on either side of the Hudson river, except Westchester, to and including Albany and Rensselaer. *Adirondack and Northern District:* The northern section of the State—the counties of Washington, Warren, Hamilton, Essex, Clinton, Franklin, St. Lawrence, Jefferson and Lewis. *Mohawk Valley District:* Schenectady, Schoharie, Saratoga, Montgomery, Fulton, Herkimer, and Oneida counties. *Southern Tier District:* The seven counties along the southern border of the State—Broome, Tioga, Chemung, Steuben, Allegany, Cattaraugus, Chautauqua. *East Central District:* Sullivan, Delaware, Otsego, Madison, Chenango, Onondaga and Cortland counties. *West Central District:* Cayuga, Tompkins, Seneca, Schuyler, Ontario, Yates, Livingston, Genesee and Wyoming counties. *Lake Ontario and Western District:* Oswego, Wayne, Monroe, Orleans, Niagara and Erie counties.

ANTITOXIN LABORATORY

Report of the Director.

February 1, 1904.

DANIEL LEWIS, M. D., *Commissioner of Health, New York State Department of Health, Albany, N. Y.:*

Dear Sir—I have the honor to herewith report upon the work carried on in the Antitoxin Laboratory during the year nineteen hundred and three. The work is still conducted in a portion of the Bender Hygienic Laboratory and in the laboratory's stable. Both of these allotments of quarters have been entirely satisfactory for all the requirements up to the latter part of the year, but the great increase in the amount of diphtheria antitoxin distributed, and the new work begun upon subjects relating to streptococcus and pneumococcus infections, and also the work looking toward the production of a preventive and curative serum for the acute dysenteries of children as well as of adults, have caused the overoccupation of all the available space, both in the laboratory and stable quarters. Plans are under way for the enlargement of the stable facilities, and if the work continues to increase some arrangement for the enlargement of the laboratory facilities will be necessary.

The plan, outlined in the preceding report, for the prosecution of the work properly belonging within its field of operation has been adhered to. It was, in brief, to develop those portions of the work which had the most practical bearing first, leaving those problems which, while theoretically are of great importance, and which in time may become of the greatest practical value, to be considered subsequently, but as rapidly as the routine procedures and the laboratory facilities permitted.

In the last report special emphasis was laid upon the work accomplished during the first year of the laboratory's existence in the preparation and distribution of diphtheria antitoxin for use in all the state charitable and medical institutions and for all citizens of the state who were unable to purchase the remedy. Copies of the literature, such as circulars, requisition, receipt and report blanks, were included in that report, and their use has been continued without any important alteration.

During the year diphtheria antitoxin has been distributed to all of the forty-three cities of the state, with the exception of New York, which has its own laboratory, and also to two hundred and four villages and two hundred and eight towns. The following table will illustrate the increase in the number of places to which supplies of antitoxin are regularly sent:

	1902.	1903.
Cities supplied	30	43
Villages supplied	161	204
Towns supplied	171	280
Total	362	527
Average number of places per county.	6	9

It can be clearly seen that the work of the laboratory is becoming more and more appreciated by the health officers and medical profession. That there are still health officers in the state who do not know of the existence of the Antitoxin Laboratory in connection with the Department is undoubtedly true, but when every health officer has been appointed by you for a term of four years, as will be the case during the coming year, it will be somewhat easier to keep each physician holding the position of health officer informed of the work of this laboratory than it was under the old system where those offices frequently changed hands from year to year.

The total output of diphtheria antitoxin, calculated on the basis of fifteen hundred units per bottle, was 14,121 bottles, or more than double the amount distributed during the first nine months of the laboratory's existence. In the following table is shown the output from the beginning of the distribution in March, 1902, until December 31, 1903:

Nine months, 1902, 6,552 bottles of 1,500 units each.

Year 1903, 14,121 bottles of 1,500 units each.

Average strength of potency of the serum in 1902, 300 antitoxic units per cubic centimeter.

Average strength of potency of the serum in 1903, 325 antitoxic units per cubic centimeter.

Out of the total amount of diphtheria antitoxin distributed, the equivalent of 1,973 bottles each of 1,500 units were sent to eight (8) state charitable institutions and hospitals.

In the last report reference was made to the continued presence of diphtheria in the Willard State Hospital for several years up to that time. During the first half of the year antitoxin was supplied to this institution in about the same amounts as in the previous year, but from August to December no supplies were sent, and in a personal communication the bacteriologist of that institution stated that the disease had been practically eliminated from the hospital. The superintendent, Dr. William Austin Macy, has made the following report upon the results obtained by the use of this Department's antitoxin:

"I would state that during the year 1903 there were fifteen (15) clinical cases of diphtheria, thirteen (13) of which were treated with antitoxin. The amount of antitoxin used in each case varied from 2,400 to 9,500 units."

Only one patient received 2,400 units; two received 3,500 units; eight received 3,000; one received 8,000; and one 9,500 units.

Favorable results were obtained in all cases after one or two injections of the antitoxin.

1,035 persons were immunized, the ordinary immunizing dose being 500 units. No person immunized developed diphtheria within twenty-five days after the injection.

The Utica State Hospital, which was a large consumer of antitoxin last year, again utilized the laboratory's product in order to hold the disease in check. Reports show that nineteen cases of the disease occurred during the year with but one death, and that patient was in dying condition from chronic heart disease at the time she contracted diphtheria. During the year 1,385 immunizing doses were administered. Many exposed inmates and nurses received preventive injections on several occasions, and in this manner the number of cases of the disease was limited to the nineteen cases referred to above.

Other state institutions receiving smaller amounts of antitoxin were the New York State Industrial School, where eleven cases were treated with no deaths; the Western House of Refuge with ten cases and no deaths, and Craig Colony at Sonyea, New York State School for the Blind and the Manhattan State Hospital.

By far the most decisive beneficial results which have yet been obtained by the use on a large scale of the diphtheria antitoxin supplied by the laboratory were obtained in the Elmira State Reformatory. In the early part of November an epidemic of diphtheria started in the reformatory, and not knowing of the existence of this laboratory, although all state institutions were notified in the spring of 1902 that the laboratory was prepared to send out supplies to them on request, antitoxin for the treatment of the cases was purchased. On being informed that this Department was prepared to send them all the antitoxin that was needed free, the superintendent made a requisition upon us for sufficient to immunize the entire population of the reformatory, and accordingly the equivalent of eight hundred and seventeen bottles of 1,500 units each were forwarded to them in three lots, and all within a period of three days.

To the senior physician, Dr Frank L. Christian, I am indebted for the following facts:

"During a period of eight days there developed fifty-seven cases of diphtheria notwithstanding all possible quarantine precautions. These were treated with antitoxin, but none had received an immunizing dose. After the remainder of the population had been immunized only eight cases developed, and these within three weeks after immunization, and no more have appeared up to the present writing, over three months later.

"Of the fifty-seven cases developing first, four died, while the eight cases occurring amongst the inmates after immunization were mild, uncomplicated cases, and all made a speedy recovery.

One officer declined to be immunized and singularly enough he contracted the disease.

"Necessarily a very general and effective disinfection and sterilization have been steadily carried on, but this in itself would not account for the sudden checking of the epidemic. We anticipated many sporadic cases, but these have fortunately failed to develop, and the complete immunization is the only explanation that I have for this circumstance. It is extremely unlikely that quarantine and disinfection would accomplish this result. Furthermore, cultures taken from the halls, cells, window ledges and ventilators have shown the presence of the diphtheria bacillus. Undoubtedly many sources of infection still exist. It is scarcely possible to secure the absolute disinfection of so complex a structure as the reformatory notwithstanding that every effort has been made to secure cleanliness. It is apparent that antitoxin does immunize, and that the period of duration of protection extends over a greater period than has formerly been supposed."

While the conclusions of Dr. Christian are an exceedingly gratifying tribute to the value of the protection afforded by the use of preventive doses of antitoxin, it would seem to be also a warrantable conclusion that if the disinfection and quarantine were carried on with the same promptness, vigor and efficiency which characterized the work of immunization, and they doubtless were, then those measures also had a very large share in the stamping out of the disease in the amazingly short time of about four weeks from the outbreak of the epidemic.

The details of the cases and of the results of the immunization will be considered later in connection with the studies upon those special subjects.

The facts just presented certainly amply bear out the statements made in the last annual report, which will bear repeating. "The benefits derived by the state institutions from the production of this antitoxin by this Department are not fairly represented by the retail valuation of the antitoxin. Its production by this Department permits the prompt filling of orders of almost any amount on the very shortest notice, and in such a manner as best suits the conditions under which the remedy will be used, and without the necessity for any delay or hesitancy on account of the cost. These considerations are of the greatest value, as they place any state institution in a position to at once suppress an epidemic of diphtheria before it has fairly started, thus making it possible not only to protect from disease and possible death its inmates and employees, but also to avoid to a large extent the trouble and expense always incident to a prolonged epidemic."

It is hardly necessary to enumerate the other charitable institutions in the state, but not supported directly by it, which have received antitoxin. The list would include practically all the hospitals in the larger cities which treat cases of diphtheria and a large number of orphan asylums and children's hospitals as well.

Although the physicians applying for antitoxin sign an agreement to make a return of the results obtained from the use of the antitoxin, but a small fraction of them finally fulfill their promise. Plans are under way looking towards the obtaining of more of these reports. However, in all probability, those that are returned fairly represent the results obtained by use of the antitoxin in all of the cases.

In all, reports have been received from physicians showing the use of the laboratory's antitoxin on 5,863 persons. Of this number 1,104 persons were actually ill with diphtheria, or with what at least was thought to be diphtheria, and the treatment was directed towards the cure of the disease, while 4,759 persons were not sick, but had been exposed to the disease and received immunizing doses.

Of the 1,104 ill persons treated, the reports of the attending physicians were, at the time of the preparation of this report, incomplete, in that the final termination of the cases was not given in 71 instances.

Of the other 1,033 cases treated, a positive bacteriological diagnosis had been given in 343 cases, and of these there were 31 cases that terminated fatally (Table I), making a fatality of 9 per cent. Of the other 690 cases, in 652 no bacteriological diagnosis had been made, and of these 57 died, giving a fatality of 8.7 per cent. Of the remaining 38 cases, in which negative bacteriological diagnoses had been made, one developed a typical post diphtheretic paralysis, and the case should be considered as one of diphtheria, and 30 other cases were pronounced diphtheria clinically, and of these, one, from a clinical standpoint a case of laryngeal diphtheria, was fatal.

TABLE I

Showing results of bacteriological diagnoses and the deaths in each group

BACTERIOLOGICAL DIAGNOSIS	Number of cases	CLINICAL DIAGNOSIS			Deaths	Fatality
		Positive	Negative	Not given		
						Per cent.
Positive	343	337	4	2	31	9
Negative	38	31	4	3	*1	
Not given or doubtful	652	593	3	56	57	8.7
Total	1,033	961	11	61	89	8.6

* Fatal case, probably diphtheria.

TABLE II

Showing diagnoses from a clinical standpoint with the deaths in each group

CLINICAL DIAGNOSIS	Number of cases	BACTERIOLOGICAL DIAGNOSIS			Deaths	Fatality
		Positive	Negative	Not given		
						Per cent.
Positive	961	337	31	593	85	8.8
Negative	11	4	4	3	0	
Not given or doubtful	61	2	3	56	4	6.5
Total	1,033	343	38	652	89	8.6

As seen in Table II there were 961 cases which were clinically diphtheria, and 11 not diphtheria. However, of these 11, the bacteriological diagnosis was positive in 4, leaving 7 cases of the total number which did not appear to be diphtheria. There remain, however, 61 cases in which no clinical diagnosis was stated, and of these 2 were diphtheria bacteriologically, 3 were negative bacteriologically, and in 56 no bacteriological diagnosis was made.

If we eliminate all the cases in which the diagnoses, both bacteriologically and clinically, are negative, not given, or in which the diagnosis is negative in the one and not given in the other, which amount to 66 cases and 4 deaths, we have remaining 967 cases and 86 deaths, or a fatality of 8.8 per cent in the cases in which the diagnosis was positive, either from a clinical or bacteriological standpoint, or from both.

Inasmuch as the death rates of the groups vary less than one-half of one per cent, the further consideration of the cases will be taken from the totals of 1,033 cases with 89 deaths, giving a fatality of 8.6 per cent.

Too few physicians gave the location of the disease to permit more than a mere suggestion as to the influence of this factor on the severity of the disease, as seen in Table III. The figures are suggestive in that the death rate in all the groups where the larynx was involved was invariably higher than for any other location.

TABLE III

Showing location of disease, where reported, with deaths in each group

	Nasal	Pharyngeal	Laryngeal	Nasal and pharyngeal	Pharyngeal and laryngeal	Nasal, pharyngeal and laryngeal	Not stated
Cases	4	87	72	15	8	2	845
Deaths	1	8	29	4	4	1	47

The influence which the time of injection of the antitoxin has on the termination of the case is very strikingly shown in Table IV, where the death rate in the cases injected on the first day is barely one per cent, while that of those injected on the fifth day or over is between twenty-three and twenty-four per cent.

TABLE IV

Showing days of disease on which antitoxin was first injected

	First	Second	Third	Fourth	Fifth	Sixth and over	Not stated	Totals
Cases................	202	312	148	83	37	52	199	1,033
Deaths..............	2	9	15	13	9	12	29	89
Fatality, per cent...	1.0	2.8	10.1	15.6	24.3	23	6.8	8.6

The regularity observed in the results due to the time of injection of the first dose of the remedy is not manifest in the results obtained by the different total amounts of serum given, as shown in Table V. It might seem at first glance as if the more serum given the higher the death rate, but there are many factors operating to bring about these results which must be considered. In the more serious cases it is natural to administer larger amounts of antitoxin than in the milder infections, and yet one would hardly care to claim that it would be as possible to obtain even with any amounts of antitoxin just as low a death rate in such cases as in the mild forms of the disease. However, if the details of the cases dying after receiving the largest doses are known and considered it will be found that either the treatment was inaugurated late or that some serious complication has ensued. Thus of the five deaths in cases receiving over 20,000 units of antitoxin, in one the treatment was not instituted until the fifth day, and during that day but 3,000 units were given; the tonsils were greatly enlarged and the throat practically occluded, necessitating tracheotomy. Another case in a child a year and a half old the treatment was begun on the fourth day, but the child died on the ninth day suffering from pneumonia and enteritis. In a third case treatment began on the seventh day of the illness, and in the first twenty-four hours received but 2,500 units and 5,000 units in the next, while during the next seven days received individual daily doses of but 2,500 units, and this notwithstanding the fact that the child grew progressively weaker. While 21,500 units were given in all, the average was but a trifle over 1,500 units a day for the two weeks she was ill. In the fourth case treatment was commenced promptly and vigorously carried on and the patient apparently recovered, but died later of nephritis. In the fifth case treatment was instituted on the fourth day of the disease in a child less than a year and a half old. Intubation was necessary on the second day of the treatment. In all, 21,000 units were administered. All five were, therefore, very severe cases; two had serious complications; all but one were untreated for four days or longer, and two were infants. Considering these factors, the death rate was hardly greater than should be expected in this class.

It is of interest to note, that by excluding the cases in which the total dosage is not known, we find more than half the cases received over 2,500 units and one-third received 5,000 units or over.

TABLE V

Showing amounts of antitoxin administered

SIZE OF DOSE	Number of cases	Per cent of cases	Deaths	Fatality
				Per cent
Not given	102	9.8	5	4.9
Up to and including 1,000 units	15	1.5	1	6.6
1,000 to 1,500 units	159	15.4	10	6.2
2,500 units	261	25.3	18	6.9
3,000 units	97	9.4	9	9.3
4,000 units	81	7.8	7	8.6
5,000 units	113	10.9	14	12.3
6,000 units	54	5.2	4	7.4
7,000 units	28	2.7	3	10.7
8,000 units	39	3.8	3	7.6
10,000 units	34	3.3	5	14.7
20,000 units	38	3.7	4	10.5
64,500 units	12	1.2	5	41.6
Totals	1,033	100.0	89	8.6

In Table VI will be found the number of individual doses of each size administered to the cases in our series the reports on which permitted the accurate determination of this point.

TABLE VI.

Showing the relative frequency of the administration of doses of various sizes.

SIZE OF DOSE	Number administered	Per cent of whole
Up to and including 1,000 units	21	1.4
1,500 units	493	31.4
2,000 units	37	2.4
2,500 units	694	45.2
3,000 units	155	10.1
4,000 units	48	3.5
4,500 units	10	.7
5,000 units	63	4.1
6,000 units	7	.5
7,500 units	7	.5
8,000 units	2	.2
Totals	1,537	100

As the two packages distributed by the Department consist of vials containing 1,500 units and 2,500 units, respectively, it is readily seen in the table that convenience plays a large part in the decision made by the physician of the amount to be injected at one time. It is important, therefore, that the packages sent out shall be such as are deemed best suited to the cases likely to be met with. That two sizes are needed is evident, for many cases require but 1,500 units. A vial of this size is also economical for use in immunizing, as it holds three ordinary prophylactic doses of 500 units each, and three persons in connection with the occurrence of one case of the disease would probably be a fair average. However, a reference to the table shows that the majority of physicians deem at least 2,500 units to be none too large a dose, and the fact that 10 per cent of all doses given were of 3,000 units, and that nearly another 10 per cent were of 4,000 units or over, would indicate that if the 2,500 unit package contained 3,000 units it would more nearly supply the implied desires of the physicians represented by these cases.

While two 1,500 unit packages would give a 3,000 unit dose, economy in laboratory routine would be better observed in the preparation and distribution of the larger size package. There would also be the added advantage of stimulating the use of a proper sized dose of antitoxin in the average case of the disease by making its administration more convenient to the physician. It would seem therefore to be desirable to change the 2,500 unit package to a 3,000 unit one.

As has been previously stated, there were 89 deaths. It would seem to be most valuable to study these fatal cases with the object of ascertaining, where possible, what factor, or factors, operated in the production of that unfortunate termination. As in the report of last year, these cases will be divided into groups or classes. The first of these will contain the cases which were moribund when first seen by the physicians treating them. The second, the fatal cases not receiving antitoxin until the third day or later. The third, those cases dying suddenly from rapid heart failure. The fourth, the cases in which a serious complication contributed to the fatal termination. The fifth, the fatal cases under two years of age, and the sixth group the remaining cases. the reports on many of which were so incomplete as to make it very difficult to classify them.

In group one (Table VII) there are nine cases which were moribund when the physicians first saw the cases and were able to give antitoxin. Five of these cases could also be classified in group two, as they did not receive antitoxin until the third day or later. Two cases could be classified under group three on account of the occurrence of heart failure, two others under group four on account of serious complications, and cases 40 and 89 under group five, as they were under two years of age.

TABLE VII.

Fatal cases—Moribund when first dose of antitoxin was administered.

Case number	DIAGNOSES		Type of disease	DAYS ANTITOXIN INJECTED AND AMOUNTS												Complications and operations	Hour of death after first dose
	Bacteriological	Clinical		?	1	2	3	4	5	6	7	8	9	10	11		
20	+	+	Laryngeal						4,000							Intubation	9
30		+	Laryngeal		2,500 2,500 1,500												12¼
35		+	Laryngeal			4,000										Sepsis	12
40		+	Laryngeal		700											Bronchitis	Few
47		+	?							1,200						" Paralysis of heart "	8
51		+	Laryngeal				4,000										Few
60		+	Laryngeal and nasal												1,500		9¼
69		+	?	2,500													Few
89		+	Laryngeal					2,500 1,500									Few

In group two (Table VIII) there are forty-seven cases which were first injected with antitoxin on the third day or later. Many of these cases could be placed with equal propriety in other groups, as will be seen by an examination of the table. However, as delay in the administration of antitoxin is a matter of the most serious consequence, it was thought best to show them together in one group. However, five of the cases of class one should be added in order to show the total number injected on or after the third day, making fifty-two cases, or fifty-eight per cent, of all deaths.

TABLE VIII

Showing fatal cases not receiving antitoxin until the third day or later

Case number	DIAGNOSES		Type of disease	DAYS ANTITOXIN INJECTED AND AMOUNTS											Complications and operations	Day of death	Remarks
	Bacteriological	Clinical		3	4	5	6	7	8	9	10	11	12	13	Over 13		
1		+	?			3,000 2,500											6th	"Cardiac paralysis"
2		+	Laryngeal								1,500					Intubation	10th	Death due to operation
6	+	+	?				1,500 1,500										7th	Death due to heart failure
7	+	+	?			1,500 1,500										Broncho-pneumonia	?	
9		+	Pharyngeal and laryngeal	2,500	2,500												?	
11	+	+	Laryngeal				3,000	3,000	6,000	5,000 6,500						Tracheotomy	10th	"Tonsils almost occluded throat"
12	+	+	?		4,000 2,500 5,000	3,000 4,000 5,000	3,500	2,500 2,500	2,500	2,500						Pneumonia and enteritis	9th	
13	+	+	Laryngeal			2,500 2,500	2,500 2,500 2,500 1,500	1,500 1,500 1,500								Broncho-pneumonia; intubation	8th	
14	+	+	?						1,500 1,500								14th	Sudden heart failure
15	+	+	Laryngeal			2,500 2,500	2,500 2,500	2,500 1,500 2,500								Intubation	6th	
17	+	+	?				3,000										?	
18	+	+	Pharyngeal and nasal												2,500 3,000		15th	
24	+	+	?	2,500													?	
25	+	+	?					1,500 1,500								Intubation	?	
28		+	Nasal and pharyngeal			2,500 2,500	1,500										6th	
29		+	Laryngeal		2,500 2,500	2,500										Heart weak from first	5th	

TABLE VIII—(Concluded)

Case number	DIAGNOSES		Type of disease	DAYS ANTITOXIN INJECTED AND AMOUNTS											Complications and operations	Day of death	Remarks
	Bacteriological	Clinical		3	4	5	6	7	8	9	10	11	12	13	Over 13			
31		+	?	3,000													?	
34	+	+	?					2,500	2,500 2,500	2,500	2,500	2,500	2,500	2,500	1,500		14th	Gradually weakened
36	+	+	?	2,500												"Acute nephritis" "Uraemia"	?	
37		+	Pharyngeal and laryngeal		2,500												?	
41		+	?	1,500													?	
42		+	?	3,000			1,500									Gonorrheal arthritis	21st	Miliary tuberculosis
46		+	?	1,500	2,500												?	
48	+	+	?			5,000											?	
52		+	?			5,000										Scarlet fever	?	"Heart failure"
53		+	?		2,500											Scarlet fever	10th	Sudden heart failure
54		+	Laryngeal			2,500	1,500									Intubation	7th	
55		+	?				+2,500			‡2,500	‡2,500			12,500		Scarlet fever; otitis media	?	"Died of exhaustion"
56		+	Pharyngeal	2,500												Pneumonia	?	
57		+	Pharyngeal and laryngeal		3,000 2,000	3,000 3,000 2,000	3,000 3,000 3,000									Intubation	7th	
58		+	Laryngeal and pharyngeal		2,500											Intubation	?	
59		+			2,500	2,500 2,500	2,500 1,500										8th	"Sudden collapse"
61	+	+			2,500		1,500	1,500									?	
62		+							3,000								?	
63		+	Laryngeal		2,500												?	
64		+	Laryngeal	2,500													?	
65		+	Laryngeal	2,500 2,500	1,500 2,500	1,500 1,500 2,500											5th	
66		+															?	

67	......	......	......	......	......	......	......	......	......	2,500	2,500	......	......	......	......	......	10th	
68	......	+	......	2,500	......	......	......	......	......	......	......	......	......	......	......	......	?	
72	......	+	......	......	2,500	2,500	......	......	......	......	......	......	......	......	......	......	5th	
73	......	+	Laryngeal	......	......	......	......	1,500	......	......	......	......	......	......	......	......	7th	Sudden heart failure
75	......	+	Laryngeal	......	......	2,500	......	......	......	......	......	......	......	......	......	......	?	
77	......	+	......	......	......	......	500	500	1,500	......	......	......	......	......	......	......	?	
78	+	+	......	1,500	1,000	......	......	......	......	......	......	......	......	......	......	......	?	"Heart failure"
83	+	+	......	......	......	......	2,500	2,500	......	......	......	......	......	......	......	......	?	Sudden heart failure
85	+	+	......	......	......	2,500	2,500	......	......	......	......	......	......	......	......	Measles......	?	Sudden heart failure

† 16th day. ‡ 19th day. § 20th day. ‖ 23rd day.

In group three (Table IX) there are eight cases which ended fatally with sudden heart collapse. These cases represent only those terminating in this way where the first dose of antitoxin was given before the third day. In Table VIII there are eleven other cases in which death was due to sudden heart complications. It is more than likely that in the majority, at least, of the cases placed in Table IX the records on the physicians' reports concerning the dates of onset of the disease are not correct, as physicians frequently put the date of their first visit down as the date of onset and then state in other portions of the report that they were called late in the disease.

TABLE IX

Showing cases in which death was due to sudden heart collapse

Case number	DIAGNOSES		Type of disease	DAYS ANTITOXIN INJECTED AND AMOUNTS						Complications and operations	Day of death	Remarks
	Bacteriological	Clinical		1	2	3	4	5	Unknown			
5	+	+			2,500			2,500			7th	Showed improvement after antitoxin was used
10	+	+		3,000	5,500	4,500					4th	
23		+		2,500							14th	
70	+	+			1,500	1,000					7th	
71		+		2,500	2,500						4th week	
83	+	+									?	Was given large doses
86											?	
87									1,500		11th	

In group four (Table X) there are nine cases, in two of which accidents due to plugging of the larynx with membrane occurred, while in the others there were coexisting with diphtheria other complicating diseases which assisted in or were the actual cause of the fatal endings. In the three previous groups there were ten more cases which could properly be placed in this group.

TABLE X

Showing fatal cases in which serious complicating diseases occurred.

Case number	DIAGNOSES		Type of disease	DAYS ANTITOXIN INJECTED AND AMOUNTS							Complicating disease and accidents	Day of death	Remarks
	Bacteriological	Clinical		1	2	Unknown days							
16	+	+	Laryngeal ...	......	......	2,500 2,500	1,500 2,500	......	......	......	Broncho-pneumonia ..	?	Intubation
44	+	+	Nasal........	1,250	......	......	......	......	......	......	Advanced stage of chronic endocarditis	4th	Insane also
45	....	+	Pharyngeal..	......	......,	4,000 3,000	4,500 4,000	4,500 4,000	4,500 4,000	3,000	Nephritis	2d week	Practically recovered from diphtheria
49	....	+	Laryngeal ...	......	......	3,000	1,500	......	......	......	Death due to attempt to intubate	?	
50	....	....	....	3,000	......	......	......	......	......	......	"Uraemic convulsions"	9th	
79	+	+	....	......	......	......	......	......	......	......	Pneumonia	?	
80	+	+	....	......	......	......	......	......	......	......	Advanced phthisis.....	?	
84	....	+	Laryngeal....	......	......	2,500	......	......	......	......	"Larynx plugged with membrane"	?	
88	....	+	....	......	......	1,500	1,500	2,500	2,500	1,500	Scarlet fever..........	?	

In group five (Table XI) there are six fatal cases in children two years of age and under. There are in the previous four groups, however, eleven additional cases in children within these age limits. It is worthy of notice that all the six cases of this group had laryngeal diphtheria, and of the eleven additional cases in other groups seven had this type of the disease, while in four the location of the infection was not given. Of these four two died of pneumonia and one with scarlet fever.

TABLE XI

Showing deaths in children two years of age or under

Case number	DIAGNOSES		Type of disease	DAYS ANTITOXIN INJECTED AND AMOUNTS			Complications	Day of death	Age in months
	Bacteriological	Clinical		1	2	3			
3	+	+	Laryngeal	2,500	2,500	....	"Asphyxia"	?	15
8	....		Laryngeal	....	2,500	....	Intubation	?	12
21	....	+	Laryngeal	....	1,500	2,000	Intubation	?	12
27	....	+	Laryngeal	....	2,500 2,500	....	....	2d	24
32	....	+	Laryngeal	....	2,500	....	....	?	24
38	....	+	Laryngeal	....	1,500	....	....	2d	15

In the sixth and last group (Table XII) are ten cases which, because of incomplete reports, or for other reasons, do not belong to an of the previous groups. As is the case with a large number of all the fatal cases, many in this group should have been given much larger doses of antitoxin.

TABLE XII

Showing the remaining ten fatal cases

Case number	DIAGNOSES		Type of disease	DAYS ANTITOXIN INJECTED AND AMOUNTS				Day of death
	Bacteriological	Clinical		1	2	3	Unknown days	
4	....	+	?	......	......	......	2,500............	4th day after injection
19	+	+	Pharyngeal	......	......	......	3,000............ 1,500 1,500 1,500	3d day of treatment
22	+	+	Nasal, pharyngeal, laryngeal	......	......	......	2,500............ 5,000 2,500	Died five weeks after onset. On the fourth day patient had fully recovered. Later paralysis supervened and became generalized
26	+	+	Laryngeal .	......	4,000	2,500	....	3d
33	....	+	Laryngeal .	......	2,500	2,500	....	? "Laryngeal stenosis"
39	....	+	Nasal, pharyngeal	......	2,500 2,500	2,500 1,500	....	?
43	....	+	Laryngeal .	......	......	......	2,500............	?
69	....	+	....	......	......	......	? "Late".....	7th "No fault of antitoxin"
74	....	+	....	......	......	......	1,500............	?
76	....	+	Laryngeal .	......	13,000	......	....	?
81	+	+	....	......	......	......	....	? "Acute toxaemia"

In order to show the good results very frequently obtained in severe cases by the early injection of large doses, or even by the use of very large doses late in the disease, a few reports from such cases are given as examples in Table XIII.

TABLE XIII

Showing examples of good results obtained from the use of large doses of antitoxin

Case number	DIAGNOSES		Type of disease	DAYS ANTITOXIN INJECTED AND AMOUNTS												Complications, operations, etc	Remarks
	Bacteriological	Clinical		1	2	3	4	5	6	7	8	9	10	11	Over		
4B^1	+	+	Nasal, pharyngeal, laryngeal							2,500 5,000 5,000 5,000	5,000 5,000 6,000	6,000 5,000	5,000	5,000	5,000	Rachitis, cervical, adenitis, stenosis, intubation	Complete recovery without sequelae in a "hopeless" neglected case in child 2½ years of age
4B^2	+	+	Pharyngeal, laryngeal		5,000 5,000	5,000 5,000 5,000	5,000 7,500 5,000	5,000 5,000 6,000	6,000							Stenosis, intubation	Complete recovery in a most severe case; child 4½ years
4B^6	+	+				5,000	5,000 6,500 5,000	3,000	1,500 1,500							Alcoholism	Recovery in the case of an adult suffering from a serious complication
4A^1		+	Laryngeal			3,000 4,500	5,000 5,000	5,000								Albuminuria, intubation	Recovery in a serious case in a child
4B^4	+	+	Laryngeal			2,500 1,500	2,500 2,500	2,500 2,500								Intubation	Recovery in a serious case in a child
4A^2		+	Laryngeal		5,000	5,000										Intubation	Recovery in a serious case in a child of 11 months
7A		+	Laryngeal				5,000	5,000									Membrane still present on the seventh day, and the physician acknowledges that he ought to have injected more serum, for the patient recovered slowly
4A^3		+	Laryngeal		2,500	7,500	5,000	5,000								Intubation	Recovery in a severe case in a child 2½ years old
9	+	+	Laryngeal	5,000												Marked laryngeal stenosis relieved in 24 hours	Case showing value of one large dose given early in a bad case
1,000		+	Throat and mouth covered with membrane			2,500	1,500 2,500	1,500 2,500	1,500 2,500	2,500 2,500	2,500						Twenty-months old child well on the 9th day

The remaining 4,759 persons receiving injections of antitoxin but who were not ill at the time were so treated in order to protect them from infection, as the larger number of them had been exposed to cases of the disease. Of these, so far as the records show, only 15 persons contracted the disease within one month from the date on which they received the immunizing dose. Eight of these occurred in the State Reformatory at Elmira and two in the Utica State Hospital. One of the latter contracted the disease twenty days and the other thirty-two days after the injection of the prophylactic doses. Of the other five cases, three developed the disease within twenty-four hours, one in forty-eight hours and one in eleven days. The average dose used in these 4,759 persons was slightly over 700 units. These figures give very strong evidence in support of the statement that a prophylactic injection of diphtheria antitoxin is very nearly a sure method of preventing the disease.

The number of physicians in the state making a practice of administering these injections is certainly on the increase. The number of persons receiving this protection is undoubtedly far in excess of the number of reports received, for the majority of physicians naturally forget to send in reports on work done three or four weeks previously. That the state distribution of the antitoxin encourages this use of diphtheria antitoxin is beyond question, and a very large part of the value of this laboratory to the people at large consists in this work—the prevention of diphtheria.

As was pointed out last year, but few physicians, municipalities or institutions, while willing to purchase antitoxin for the treatment of the sick poor, would consider it their duty to make any outlay for the prevention of the disease in those well persons unable to purchase antitoxin. The state distribution not ony provides for these needs, but by permitting the various municipalities in the state to keep supplies on hand encourages the early application of this method of preventing the disease, and its growing use in this direction is certainly attributable to the work of this department.

TETANUS ANTITOXIN.

As was stated in the report of last year, the second branch of the work of the laboratory to be undertaken was the preparation of tetanus antitoxin. Substantial progress was made in this work during the past year, and a lively interest in the work on the part of a large number of physicians of the state was stimulated, and considering the serious nature and peculiarities of the disease, excellent reports of the results obtained have been made by the physicians using the antitoxin prepared in the laboratory in actual cases of the disease.

During the year there were distributed to health officers throughout all parts of the state 950 immunizing doses of ten cubic centimeters each, and 485 therapeutic doses of fifty cubic centimeters each. This gives in all the equivalent of 3,175 immunizing doses.

Special efforts were made by the health officers of Rochester and Buffalo, and by the director of the laboratory in the cities of Albany, Troy and a number of smaller places, to encourage physicians who had cases of Fourth of July injuries to protect them from the onset of tetanus by the use of phophylactic injections of antitoxin.

It is to be regretted that reports upon the results of the use of the antitoxin as a prophylactic agent can not be obtained from all cases. The number of reports received is unquestionably but a mere fraction of the total number of persons receiving such injections. This is hardly unexpected, as it is necessary for the physicians administering the remedy to wait three weeks or longer before they can be assured that the onset of the disease is no longer to be expected and report to that effect. By that time, the patients not presenting themselves for treatment, it is quite natural that many physicians forget to make the promised report to the department.

However, medical literature fails to record but a single case of tetanus occurring after the administration of an immunizing dose of tetanus antitoxin, and of the twenty-six reports received during the year all indicated perfect protection from the disease, and this notwithstanding the fact that in all of these cases injuries of a character most likely to be followed by tetanus had been sustained. Sixteen were the result of the careless celebration of the Fourth of July.

Tetanus antitoxin supplied by the laboratory was used in the treatment of twenty-one cases of tetanus during the year.

In approaching the statistical study of such a series of cases one is at once puzzled to determine a proper basis for their classification. The disease has so many variations that the possible subdivisions in a classification are almost without limit. The usual classification of the cases according to their severity, as indicated by the duration of the period of incubation, the rapidity of the onset of severe symptoms of convulsions, and the frequency of these convulsions, tends to group the cases into three classes, namely, the acute, the subacute and chronic. The limits of these groups are, however, not definitely definable, and doubtless no two persons would classify the cases of a given series alike. When we consider the factors which determine the severity of the infection it is not surprising that difficulties exist in the artificial arrangement of the cases.

Not only the amount and condition of the infected material introduced into the injured tissues, but the character, and location, and extent of the injury, together with the manner and extent of the treatment applied, have an exceedingly large influence in determining the incidence and severity of the disease.

Without doubt many persons have received injuries in which tetanus bacilli have been carried into the tissues, and either the conditions in the wound have not been naturally favorable on the one hand to the anaerobic growth of the micro-organisms, such as the absence of dirt, foreign bodies, bacteria which in developing use up the available oxygen, dead tissues, depth of injury which excludes the air, or the presence of an active oxygenating blood circulation; or, on the other hand, the injured tissues have been opened up thoroughly and all foreign elements removed, and the conditions made entirely unfavorable for the development of the tetanus bacillus, and thus no actual infections have resulted.

The partial operation of any of these local forces which tend to obstruct the beginning of the infection may bring about the development of but a slight amount of toxin with a consequently mild form of the disease, or if these forces operate but temporarily, and the proper conditions subsequently supervene, the onset of the most severe form of the disease may be only delayed. Therefore, while the duration of the incubation period usually is an indication of the severity of the disease, it may, in fact, have but little or no significance whatever, and for similar reasons the same is true to a lesser extent of the time of onset of the severe symptoms.

Bearing these important considerations in mind, it is still possible to artificially group the cases in a general way, as has been outlined.

The acute cases are in general those with a period of incubation of from four to eight days, and with the general convulsions supervening within forty-eight hours of the onset of the first symptoms, and also in fatal cases where the entire course of the disease is less than three days.

The subacute cases may, with the same reservations, be said to be those with a period of incubation of about ten days, and with the onset of convulsions delayed to after the third day, and where, in fatal cases, the course of the disease is four days or longer.

The chronic cases usually have a prolonged incubation, and delayed or absent convulsions, and such cases usually recover.

The twenty-one cases treated are therefore arranged in accordance with the general limits of these three groups, in Tables XIV, XV and XVI.

TABLE XIV

Cases of acute tetanus treated with antitoxin

Case number	CHARACTER OF INJURY	Period of incubation (days)	Time of onset of convulsions (hours)	Complications	Stage of disease at death	ANTITOXIN TREATMENT				Duration of disease	Termination
						Hour 1st dose	First and total doses (cubic centimeters)	Methods of administration	Immediate effects of injections		
2	Nail puncture of foot	10	48	None...	Acute..	36	50 600 120	Subcutaneous... Subcutaneous... Intraspinal	Doubtful .... Doubtful .... Decided relief	4½ days	Death
3	Nail puncture of foot	7	48	None...	Acute..	24	20 270 100	Subcutaneous... Subcutaneous... Intraspinal	No effect.............. No effect.............. Some relief............	2½ days	Death
11	Comp. fracture humerus.	6	+	None...	Acute..	4	10 90	Subcutaneous. Subcutaneous.	No effect.................	36 hours	Death
12	Cartridge wound of hand.	8	+	None...	Acute..	Few	50 170	Subcutaneous... Subcutaneous...	"Seemed to control spasms for a time"..	48 hours	Death
13	Cartridge wound of hand.	10	4	None...	Acute..	24	20	Subcutaneous...	No effect.................	36 hours	Death
14	Comp. Pott's fracture....	10	?	None...	Acute..	24	20	Subcutaneous...	No effect.................	48 hours	Death
15	Laceration of toe.........	8	4	None...	Acute..	36	50	Subcutaneous...	No effect.................	39 hours	Death
17	Crushed foot	5	12	None...	Acute..	44	10 30	Subcutaneous. Subcutaneous.	No effect.................	58 hours	Death
18	Crushed hand	5	12	Sepsis..	Acute..	40	500	Subcutaneous...	No effect.................	48 hours	Death
20	Cartridge wound of hand.	6	8	Sepsis..	Acute..	6	20 40	Subcutaneous. Subcutaneous.	Doubtful	24 hours	Death
25	Cartridge wound of hand.	7	12	None...	Acute..	24	10 ?	Intracerebral ... ? ...	Relief for six hours ... No relief...............	48 hours	Death
30	Cartridge wound of hand.	8	48	None...	Acute..	48	20 60	Subcutaneous... Subcutaneous...	Slight effect .... No effect...............	3 days	Death

+ Very rapid

TABLE XV

Cases of subacute tetanus treated with antitoxin

Case number	CHARACTER OF INJURY	Period of incubation (days)	Time of onset of convulsions	Complications	ANTITOXIN TREATMENT				Duration of disease	Termination
					Hour 1st dose	First and total doses (cubic centimeters)	Methods of administration	Immediate effects of injections		
1	Abortion	9	6th day	None	24	10 1050 150	Subcutaneous Subcutaneous Intraspinal	Doubtful effect Doubtful effect Marked temporary relief	1 month	Recovery
4	Wound of toe	7	3d day	None	5th day	50 270 80	Subcutaneous Subcutaneous Intraspinal	None None Marked temporary relief	1 month	Recovery
8	Cartridge wound of hand	11	2d day	None	24	10 1640	Subcutaneous Subcutaneous	Gradual improvement	1 month	Recovery
9	Nail puncture in foot	10	3d day	None	3d day	50 2000 100	Subcutaneous Subcutaneous Intraspinal	None None Considerable relief	6 weeks	Recovery
24	Finger crushed	8	3d day	None	7th day	80 300	Subcutaneous Subcutaneous	Doubtful Doubtful	1 month	Recovery

TABLE XVI

Cases of chronic tetanus treated with antitoxin

Case number	CHARACTER OF INJURY	Period of incubation (days)	Time of onset of convulsions	Complications	Stage of disease at death	ANTITOXIN TREATMENT				Duration of disease	Termination
						Hour 1st dose	First and total doses (cubic centimeters)	Methods of administration	Immediate effects of injections		
5	Cartridge wound of hand.	5	8 days..	None...	......	8th day	50 150	Subcutaneous. Subcutaneous.	Doubtful	1 month	Recovery
6	Buzz saw wound of thigh.	11	None...	None...	......	4th day	60 650	Subcutaneous. Intravenous...	Doubtful	1 month	Recovery
7	Wound of knee...........	18	7 days..	None...	......	3d day	120 320	Subcutaneous... Subcutaneous...	Doubtful .... Doubtful	1 month	Recovery
10	Burns of third degree.....	17	*	†	‡	24	50 640 50	Subcutaneous... Subcutaneous... Intraspinal......	No effect........... No effect........... No effect...........	7 days	Death

* Delayed   † Alcoholism, morphinism, sepsis   ‡ Exhaustion

Inasmuch as the relative merits of the various methods of injecting tetanus antitoxin in the treatment of cases of the disease have been discussed by me in a paper before the Third Annual Conference of Sanitary Officers, it is not necessary to again go over that ground. However, it will be noted that in acute cases 2, 3 and 25, in Table XIV, and subacute cases 1, 4 and 9, of Table XV, both the intraspinal and intracerebral methods of injecting the serum were reported to have given some immediate relief, which was not the case in any instance from the injection of antitoxin subcutaneously or intravenously. The conclusion that antitoxin injected by the latter methods is of no value would not, however, be warranted. Such injections may have but little influence on the toxin present in the nervous system, but they certainly bring about neutralization of the toxin present in the blood and the other tissues of the body, and which if finally absorbed by the nerves, would greatly add to the severity of the case.

As has already been said, it is difficult to estimate the value the antitoxin treatment had in these cases. Undoubtedly some at least of the chronic cases shown in Table XVI would have recovered without antitoxin. However, it is more than probable that some of the subacute cases would have ended fatally if they had not been given the antitoxin injections.

The fatal termination of every acute case of the disease, irrespective of the treatment, is a forcible argument for the routine administration of tetanus antitoxin as a prophylactic agent in all wounds in which dirt or unclean foreign bodies of any kind are forced into the tissues. As has been said, such injections form a practically sure protection against the onset of the infection.

In accordance with the general plan, that when the routine work of the laboratory was once organized such investigations as time and appropriations would warrant should be undertaken. the laboratory in April began work looking towards the bacteriological investigation of acute dysentery and the production of an antidysenteric serum. Owing to the limited stable capacity the injection of but one horse with dead and living dysentery bacilli was inaugurated at that time.

In order that the antidysenteric serum might be used intelligently from a bacteriological standpoint—that is, with knowledge in each such case of the relation of the disease present to true dysentery—arrangements were made for the study of the discharges from such cases.

As in former years many cases of acute dysentery in infants had occurred in St. Margaret's House, Albany, an arrangement was entered into with Dr. Henry L. K. Shaw, the physician in charge, to carry on the bacteriological laboratory work at that place, and a small laboratory was fitted out at the House as a preparation for the work. Dr. C. L. Witbeck, assistant bacteriologist in the laboratory, and Dr. Willis E. Merriman were sent to Philadelphia to study the methods of investigation pursued there under the direction of Dr. Simon Flexner of the Rockefeller Institute. This institute was planning to carry on a similar investigation in New York, Philadelphia, Baltimore, Boston, and in other large cities. Owing doubtless to the prevailing climatic conditions, but few cases of diseases of a dysenteric type presented themselves either in Albany or the rest of the state, and there was but little that could be done. As the results of this investigation were so meager and will be published elsewhere* along with a general summary of our knowledge of the etiology and serum treatment of dysentery, it is not necessary to include the same here.

Reports of the results obtained elsewhere by the treatment of cases of the summer diarrheas of children with antidysenteric serum do not give an encouraging outlook for its future usefulness.

Work looking towards the preparation of antistreptoccoccic and antipneumoccoccic serums was likewise begun during the year (September), but has not advanced far enough to warrant any statement concerning the outcome of such preparations as curative agents.

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*Albany Medical Annals, 1904. 25, p. 154.

Reports of the results of the use of such serums prepared by various methods are not harmonious, and their future usefulness is still uncertain.

Respectfully submitted.

HERBERT D. PEASE,
Director antitoxin laboratory

BUREAU OF VITAL STATISTICS

Bureau of Vital Statistics.

Hon. Daniel Lewis, *State Commissioner of Health, Albany, N. Y.:*

Sir—I have the honor to herewith tender report covering the work in the Bureau of vital statistics for the year of 1903.

There are at present 1,395 local boards of health in the state, outside of the cities of Albany, Buffalo, Greater New York and Yonkers, directly under the jurisdiction of the State Department of Health, representing 932 towns, 422 incorporated villages and 41 cities. This is an increase of 7 over last year.

During the year the Department has kept in close touch with the local boards, keeping them advanced as to the changes in the public health laws, and supplying them with all necessary registration blanks, etc., and earnestly requesting a more complete registration of vital statistics. While there has been an improvement throughout the state in the registration it is not up to the standard required by the Department.

During the year 17,120 reports were received from the local registrars of vital statistics.

CITY REGISTRATION

The following table shows the registration of births and deaths as reported from the cities in the state, and the birth and death rate for the year as compared with 1902:

CITY	Population	Births	Deaths	RATE PER 1,000 POPULATION			
				1903		1902	
				Birth	Death	Birth	Death
Albany	*100,000	1,423	1,808	14.2	18.0	13.0	17.2
Amsterdam	20,929	405	400	19.4	19.1	18.0	16.7
Auburn	35,000	558	518	16.0	14.8	16.3	15.4
Binghamton	39,647	545	528	13.0	13.3	13.5	15.7
Buffalo	*370,000	7,146	5,678	19.3	15.3	19.3	14.5
Cohoes	24,000	527	465	22.0	19.3	17.0	18.4
Corning	11,061	189	168	17.1	15.2	15.8	13.4
Cortland	9,014	142	168	15.7	18.6	12.2	13.0
Dunkirk	11,616	440	230	37.9	19.8	33.5	19.7
Elmira	35,672	483	509	13.5	14.2	14.5	13.6
Fulton	*8,734	123	145	14.1	16.6	17.3	11.2

* Estimated.

CITY	Population	Births	Deaths	RATE PER 1,000 POPULATION			
				1903		1902	
				Birth	Death	Birth	Death
Geneva	10,433	238	174	22.8	16.7	17.5	16.0
Gloversville	18,849	288	287	15.4	15.7	15.7	13.2
Hornellsville	12,000	218	191	18.1	16.0	17.8	12.8
Hudson	9,528	1[illegible]	180	18.6	18.8	16.8	19.0
Ithaca	13,136	179	268	13.6	20.5	13.8	16.0
Jamestown	22,892	460	307	20.1	13.4	19.8	11.2
Johnstown	10,130	156	156	15.4	15.4	15.6	13.2
Kingston	24,535	467	427	19.1	17.4	20.4	16.4
Little Falls	10,381	177	116	17.0	11.2	11.5	8.5
Lockport	16,581	323	289	19.5	17.4	24.4	13.7
Middletown	14,522	181	201	12.5	13.8	13.1	17.0
Mt. Vernon	20,846	571	288	28.1	13.9	21.2	15.1
Newburgh	25,000	430	476	17.2	19.0	15.7	19.0
New Rochelle	14,720	433	207	29.4	14.1	25.5	15.7
Greater New York	*3,782,903	94,753	†67,864	25.3	18.1	23.6	18.7
Niagara Falls	19,457	459	372	23.5	19.1	25.1	19.1
North Tonawanda	9,069	171	106	18.8	11.6	21.7	12.0
Ogdensburg	12,633	221	231	17.5	18.3	18.5	15.1
Olean	9,462	193	103	20.4	10.8	15.2	12.2
Oneida	7,942	124	109	15.6	13.9	16.2	13.4
Oswego	22,200	344	324	15.5	14.6	17.0	14.6
Plattsburgh	8,484	196	132	23.2	15.6	24.7	13.5
Poughkeepsie	24,029	489	461	20.3	19.2	19.9	17.5
Rensselaer	7,466	119	169	16.0	22.6	16.6	16.4
Rochester	162,608	3,041	2,452	18.7	15.1	17.8	13.6
Rome	15,343	322	304	20.9	19.8	20.4	17.3
Schenectady	*47,625	808	795	17.0	16.7	18.6	14.0
Syracuse	108,374	1,676	1,610	15.5	14.9	15.6	14.0
Tonawanda	7,421	133	95	17.9	12.8	18.0	15.2
Troy	75,057	851	1,450	11.4	19.3	10.0	19.0
Utica	56,888	1,143	968	20.8	17.1	20.0	17.3
Watertown	21,700	364	339	16.8	15.6	18.5	14.6
Watervliet	14,321	131	238	9.2	16.6	8.9	15.0
Yonkers	*50,000	1,200	842	24.0	16.8	24.5	18.1

* Estimated † Includes 987 deaths of nonresidents in city hospitals, etc.

The above table includes the deaths occuring in the public institutions excepting Auburn, where the deaths occuring in the state prison are excluded; Binghamton, State Hospital; Elmira, Reformatory; Middletown, State Hospital; Ogdensburg, St. Lawrence State Hospital; Poughkeepsie, Hudson River State Hospital; Rochester, State Hospital; Utica, State Hospital.

While the registration of deaths in most of the cities of the state is considered complete, it will be noticed from the above table that in many cities the registration of births is unsatisfactory.

DEATH RATE IN STATE INSTITUTIONS.

The following table shows the death rate in the larger of the state institutions during the year, as compared with 1902:

INSTITUTION	Inmates	Deaths	Death Rate Per 100	
			1903	1902
Auburn State Prison	1,112	13	1.16	0.67
Binghamton State Hospital	1,400	95	6.79	7.30
Bloomingdale Asylum	327	31	9.48	5.47
Buffalo State Hospital	1,648	164	9.90	8.27
Clinton Prison	1,022	12	1.16	1.61
Craig Colony	831	48	5.77	4.33
Dannemora State Hospital	206	5	2.50	0.65
Elmira Reformatory	1,433	14	1.00	0.48
Gowanda State Hospital	671	25	3.72	3.47
Hudson River State Hospital	2,113	175	8.32	8.25
Long Island State Hospital:				
Kings Park	2,757	181	6.56	6.62
Brooklyn	1,200	84	7.00	8.67
Manhattan State Hospital:				
East	1,861	234	12.56	14.42
West	2,103	162	7.71	6.97
Central Islip	3,431	219	6.38	5.42
Matteawan State Hospital	591	21	3.55	2.83
Middletown State Hospital	1,308	53	4.05	4.71
New York State Soldiers and Sailors' Home	1,685	134	8.00	10.11
Rochester State Hospital	671	81	12.10	12.50
St. Lawrence State Hospital	1,717	138	8.00	8.68
Sing Sing Prison	1,183	10	0.84	0.70
Utica State Hospital	1,068	92	8.60	8.86
Willard State Hospital	2,241	131	5.85	6.39

CERTIFICATES FILED IN BUREAU.

The certificates filed in the Department from the registration districts in the state outside of Albany, Buffalo, Greater New York and Yonkers for the year were:

	Births	Deaths	Marriages
January	4,062	4,445	2,215
February	4,844	4,242	2,016
March	4,254	4,858	1,834
April	4,258	4,533	2,176
May	4,307	4,233	1,849
June	4,242	3,751	3,335
July	4,398	4,109	2,202
August	4,244	4,276	2,190
September	4,529	3,918	2,821
October	5,642	4,077	3,052

	Births	Deaths	Marriages
November	4,648	4,116	2,730
December	4,182	4,623	2,885
Total	52,610	51,181	29,305

Total births, deaths and marriage certificates filed, as above, 133,096.

TOTAL REGISTRATION IN STATE.

The complete registration of vital statistics in the whole state as reported for the year was as follows:

	Births	Deaths	Marriages
January	14,148	11,895	6,521
February	12,051	10,885	5,324
March	12,529	11,237	4,548
April	13,838	11,958	6,182
May	11,439	10,236	4,351
June	12,847	9,061	7,923
July	14,471	11,822	5,852
August	12,644	9,977	5,090
September	14,862	10,377	6,935
October	13,717	9,323	6,654
November	12,374	9,699	6,705
December	13,466	11,961	6,928
Total	158,386	128,431	73,013

The statistics of the state as reported for the year 1902 were: Births, 146,740; deaths, 124,541; marriages, 68,903.

The statistics of 1903 show a state death rate of 17.6 per 1,000 population, and a birth rate of 21.8. With as close a registration of births as there is of deaths, no doubt the true birth rate would exceed 25 per 1,000 population.

The registration of births, deaths and marriages as reported for the year from the different registration districts in the state show an improvement over last year, and every effort is being put forth by the Department to bring the registration of births and marriages up to the standard of that of deaths, which is accepted as being nearly complete.

DELINQUENT REGISTRARS.

That the local registrars of vital statistics have been more prompt in making their monthly reports to the Department during the year is shown from the fact that during the year 1902 it was found necessary to send 2,506 "delinquent notices" to registrars, and that the average number of registrars failing to file their monthly report each month was 33, while for the year 1903, 2,056 "delinquent notices" were mailed local registrars, with but an average of 26 failing to report each month.

There are several "chronic" delinquents who seem to persist in ignoring the state health laws and the rules of the Department covering the registration of vital statistics, and it appears that the only remedy to compel complete registration from these districts would be an amendment to the Public Health Law requiring the appointment of health officers as the registrars of vital statistics, or making the municipality bear all expenses incurred in sending a representative of the Department to take charge of the registration until satisfied that the municipal authorities would make the registration complete and forward the certificates promptly to the State Department of Health on the first of each month.

DEFECTIVE CERTIFICATES

During the year there were returned for correction 1,248 defective certificates. The new form of certificate adopted by the Department last year for the registration of vital statistics has been the means of getting a more complete record for statistical purposes, and that an improvement has been made during the year in getting better records of the births, deaths and marriages occurring in the state is shown from the fact that while more certificates have been filed in the Department there were less defective certificates received than in the previous year, when 1,365 were returned for correction.

TRANSCRIPTS

During the year there were 390 written requests for transcripts of certificates received, to be used for legal and administrative purposes, and many verbal requests were made for the same purpose.

The condition of the work in the bureau is most satisfactory. During the year there were indexed and properly filed for safekeeping 89,067 birth certificates, 48,976 death certificates and 21,276 marriage certificates, and 198,653 cards were added to the index system. In addition to the above all delayed certificates received during the year were indexed and properly filed in their respective years.

Respectfully submitted.

F. D. BEAGLE,
Registrar of Vital Statistics.

Proceedings of the Conference
OF THE
Sanitary Officers of the State.

Third Annual Conference of Sanitary Officers of the State of New York, Held in the Assembly Chamber, Capitol, at Albany, N. Y., October 8 and 9, 1903

OPENING SESSION

THURSDAY, *Oct.* 8, 1903, 2.30 P. M.

The conference was called to order by Dr. Daniel Lewis, State Commissioner of Health, in the following words:

GENTLEMEN—Inasmuch as Dr. Johnson, the secretary of the State Department of Health, has failed to prepare an address for this opening session, it devolves upon me to welcome you to this third conference.

We take it for granted that you are here because you are interested in the ideas for which the conference has been called. I find, by consulting the minutes of the last meeting of one year ago, that considerable progress has been made upon the lines which were then discussed. Those of you who were present then may remember, among other things, that the question of legislation which was needed for the better efficiency and greater efficiency of the health organizations of the State was discussed. During the session of 1903, as you are doubtless aware, several important amendments were adopted and became laws.

To my mind one of the most important, if not the most important one, was the constituting of the health officer of the various towns in the State a State officer. It only remains for you now to get the State treasurer to pay your salaries and you ought to be very happy. [Laughter.] Now a local board of health recommends the health officer, except in the cities of the State, to the State Department, and he is appointed by the State Department or Commissioner for a term of four years. He can not be removed from office except upon charges and after due trial.

The result of such legislation when it becomes fully operative, as it will next year—many of the health officers having been appointed for this year before the law was signed—after this it will mean that a man who accepts the position of local health officer accepts it with the full understanding that he is to remain a sufficiently long time in office to pay him, and the community which he represents, to perfect himself in everything regarding public sanitation and public health.

To my mind, as I said before, this is one of the greatest advances that has been made in public health legislation of the State of New York. It is not going to be the case any longer that you shall fear the opinion of your local board of health if you abate a nuisance in which one of the board happens incidentally to be interested. Perhaps that never has happened in the State of New York heretofore. [Laughter.]

Another thing is going to result from this, viz, that more is to be expected, and naturally should be expected, from the health officer. He is a State officer and he can work upon such broad lines as those which pertain to any other State department, and he must be a good health officer.

Now for the purpose of getting your views as to what is needed, the same as heretofore, and of getting some of the views and advice and counsel of men older than we are in sanitary matters, and preparing you for the broader field of usefulness which devolves under this legislation upon the health officer, we are called together to-day. The same general plan has been provided for the two days' session, as you will notice by the program.

Last year, it seemed to me that we lost some time, valuable time, in the answering of questions in open meeting, so that I would suggest that we return to the plan which we followed two years ago of having all questions to be answered by the reader of a paper sent to the desk in writing, so that the one who is to give the answer may do so intelligently and not waste the time of the whole conference. We have enough to do and say here and we should utilize every moment of the time in the practical work of the meeting.

Many other things occur to me which I would like to say to you in convention, and which I hope to have an opportunity, with your permission, to say during the next two days. At present I will leave the floor to those who are able to instruct and entertain us.

Before doing so, however, before getting down to the regular work on the program, I want to express to you my gratification that Dr. Fulton, secretary of the State Board of Health of Maryland, has consented to be present at this meeting. I presume you all know that Dr. Fulton stands at the head of the hygienic world as far as Maryland is concerned, and the most of the United States as well. He is the man who stamped out the plague in San Francisco; he edited some medical journals and very good ones, and he knows a great deal we all ought to know, and besides it is worth a great deal to us to know Dr. Fulton and I take pleasure in introducing him to you. [Applause.]

(Dr. Fulton arose and bowed his acknowledgments.)

Commissioner Lewis—Hasn't he anything to say?

(Dr. Fulton shook his head in the negative.)

Commissioner Lewis—I referred to the legislation of last session. In order that we may have a clear understanding of some of the new conditions of the public health law, Mr. Church, Deputy Attorney-General, has consented to speak to us on that subject.

COMMENTS UPON THE RECENT AMENDMENTS OF THE PUBLIC HEALTH LAW

By Hon. Sanford T. Church, Deputy Attorney-General

Mr. Commissioner and Gentlemen of the Conference.—Of the learned professions, so called, there are none that touch elbows so often as those of medicine and the law. The lawyer leans on the medical man for his expert evidence in almost every kind of litigation known to the courts, from the trial of the murderer to the breaking of the millionaire's will. So it is not altogether out of place that an humble limb of the law should attempt to point out briefly to such a learned body of medical men as this what the lawmakers of the last year have done toward changing and improving the laws of the Empire State in reference to that most important subject, the public health.

As I glance over the program I notice that I am the only legal spot on it, and as that which is strictly legal is sometimes reputed to be uninteresting, I beg to assure you that I will not keep you long from the more attractive medical dose to follow.

The recent statutory amendments of the Public Health Law are like angels' visits, few and far between, and as you had an able address last year, covering the relations of the law to the health officer, I shall only attempt to tell, as the subject assigned me warrants me to do, what the Legislature of 1903 accomplished in reference to the Public Health Law.

There are what may be termed direct and indirect amendments, changes and additions to the statutory law of health, and as any attempt to extend this paper so as to include the indirect amendments within its scope would encroach upon the time of those who follow me, I shall confine myself to the direct statutory amendments.

Of these direct changes those of the past year will be found embodied in chapters 383 and 468 of the laws.

First, then, let us consider what these acts are designed to affect and what they do in fact accomplish.

Chapter 383 is an amendment which, by its terms, applies to local boards of health and therefore is of particular interest to you who are the chief executive officers of such local board. The first change, however, made in this act is by the addition of a section, styled section 13-a, which has rather to do with the supervision and approval of the State Commissioner of Health than directly with the jurisdiction of the local board. It reads as follows:

"In all buildings and institutions, owned, maintained or controlled by the State, the plans for all water supply, sewerage, sewage-disposal, and garbage-disposal works, shall be subject to the approval of the State Commissioner of Health before being adopted or constructed."

This, in my judgment, is a most excellent provision, as it makes all the drainage system and sewage-disposal plants which are placed in the various institutions of the State subject to the approval of the State Commissioner of Health. In the past there has been altogether too much indiscriminate construction of drainage and sewage-disposal plants that were of themselves menaces to the public health in some of the State institutions, and anything that can check this must be salutary.

The next amendment contained in this chapter is one of the most pronounced steps that has been taken in health legislation in this State in some time. It is one which I hesitate somewhat to comment upon, treating as it does directly of the manner of your appointment. It is contained in the section of the Public Health Law which provides for local boards of health—section 20.

Prior to the enactment of this statute containing the amendment of 1903, this section provided that "such board of health (the local board) shall annually appoint a competent physician, to be the health officer of the town."

This would seem a simple provision and one which would need no amendment or change; but any person who has seen the way this provision has actually worked out since it has been in operation will realize the need of the change. Politics have been injected into the appointment of many of the health officers of the State and as the membership of a board of health changed together with its political complexion, it was the immediate thought of whichever party was in power to oust a health officer of the opposite political faith and substitute for him one who believed as did the majority of the board. This is perhaps human nature, but where the health officer who was ousted happened to be particularly qualified for the duties of the office by long experience and efficient service, it was certainly a loss to the community to substitute in his place an inexperienced man.

Another effect which the appointment of the health officer by the local board had was that if a nuisance happened to exist upon the premises of some person or persons in whom the local board of health or any of its members had a particular interest, the health officer might easily have been subjected to influences on the part of the appointing power which would have been exceedingly embarrassing for him, to say the least, to resist.

The result of these frequent changes, under the provisions of the act as it stood prior to 1903, has been that many good men have been from time to time supplanted by men of little experience at a time in some cases when a knowledge of the work was essential to the proper conduct of the duties of the officer.

While I do not profess non-partisanship as a general rule, and admit that I have a predilection for that old saying that "To the victors belong the spoils," yet I am firm in the opinion that there are at least two classes of positions that should have politics left out entirely. I allude to the judiciary of the State and to the officers who have the control and conduct of all matters pertaining to the public health.

We read and hear a great deal about divorcing politics and the judiciary, and I for one believe that it should be done to a much greater extent than it is; and the nomination by both of the great political parties of this State of a judge of the highest court for reelection to that position is a testimonial not alone to his great fitness for that office but also to the fact that public sentiment favors a judiciary which shall be over and above and outside of all political influences.

You hear less about the politics mixed up in the appointment of health officers, and this is doubtless due largely to the fact that there are so many of you and that you are so widely scattered throughout the State.

It would seem, however, that if the people of the State stopped to think what lay in your hands, stopped to ponder over the fact that their health—the health of seven millions and more of the inhabitants of this State—lay with you, and that when some frightful scourge decimates and lays low the inhabitants of our populous cities and villages, you stand as a safeguard to the people, they would join me in saying that your position should be divorced from petty politics as much as that of any judge in the land. The principle is, if you have got a good health officer, stick to him; and this I believe to have been the main object and effect of the amendment of 1903 to the said section 20.

This section now contains the following provision: "The State Commissioner of Health shall appoint for each municipality except in the cities of the State, on the nomination of the local board of health, a competent physician, not a member of the local board of health, to be the health officer of the municipality. The term of office of the health officer shall be four years and he shall hold office till the appointment of his successor. He may be removed for just cause by the local board of health after a hearing, such removal must be approved by the State Commissioner of Health. The health officer need not reside within the municipality for which he shall be chosen, but unless he shall, he must reside in an adjoining town."

It will therefore be seen that while the power to nominate is left with the local board, yet the actual appointment is with the State Commissioner. The term of office is made four years and until a successor is appointed. If, therefore, the local board refuses to nominate a physician in good standing in place of a reputable physician whose term of office has expired, the State Commissioner can, by refusing to appoint or nominate, continue the term of the officer whose term has expired in such office.

This also applies to removals, which must have the approval of the Commissioner.

It may be urged that politics might creep in through the medium of the office of the Commissioner of Health and that the amendment to the law is but a centralization of political power. To this my answer is that the Commissioner would hardly be apt to take part in the politics of the hundreds of health districts in the State; and although of different political faith, I do not believe the present Health Department of the State would allow politics to influence it when the health of the public was at stake.

Should such a thing ever happen, any officer that played politics with the public health would be entitled to the condemnation of every honest man.

You will note that the last provision of the new part of section 20 is to the effect that the health officer must reside either in an adjoining town or in the municipality from which he is chosen. This definitely fixes for the first time, by the Health Law, the residence of the health officer, and it takes away any ambiguity that may have heretofore been in the act.

Section 21 was also amended this year by inserting a clause which authorizes the board of health to allow the reasonable expenses incident upon the health officer's attendance upon this gathering.

This is a step in the right direction, as it certainly would be out of the question to expect health officers to foot their own bills in order to attend this meeting and give their time thereto. The only criticism I have of this measure is that it would be much more effective if it provided that the local board must allow such reasonable expenses when the local health officer, in fact, attends this conference.

I have tried to put a construction on this provision so as to make that little word "may" have the meaning of "must", in this connection, but regret to say that I can find no authority or line of reasoning that will lead to that construction in this particular case.

I believe that these meetings, properly used for the interchange of ideas and the acquiring of knowledge as to your rights and liabilities and the best means of enforcing such rights and avoiding such liabilities can not help but be instructive and beneficial, not only to you, but through you to the communities which you represent. Cooperation rather than competition is getting more and more every day to be the life of trade.

The Legislature has further looked after your material welfare in the same section by providing that the local board may allow you extra compensation where your work has been unusually severe by way of epidemic or otherwise. The object of this provision was probably to get around the decision of the Court of Appeals in the case of Reynolds vs. Mount Vernon, reported in 165 N. Y. 592, in which case a health officer sought to recover for extraordinary services during an epidemic of smallpox, and the court held that what the plaintiff had done was in the line of his official duties and that although the services performed were extra hazardous in their nature, he could not recover therefor.

The Legislature, however, if they sought to get around the above-mentioned decision, have undeniably done so by the amendment in question. It is needless for me to say that this amendment has the approval of you all.

The same section also adds a clause which provides for the service of the orders of the local board for the abatement of a nuisance, not alone on the owner or occupant of the premises where the nuisance exists, but also upon the owner or occupant of the premises upon which may exist the cause of other nuisances to other premises; and this same provision relative to the premises upon which the cause of a nuisance upon other premises exists appears in all the sections relative to the machinery for the abatement of nuisances. This was doubtless intended to and does provide an extension of the methods by which a nuisance is abated, to reach cases where the cause is in one place and the effect in another—for instance, where a sewer is stopped up and flows back into cellars sometimes a long distance from the spot where the stoppage is.

The next change is one which is in apparent contradiction of the provisions of the Village Law. It is to the effect that where the board of health of an incorporated village finds the sewer system of that village insufficient to properly sewer that village, and have gone through the legal course as prescribed by said section, it becomes the duty of the board of trustees of said village, whether sufficient funds shall be on hand for such purpose or not, to forthwith make the necessary additions or alterations in the sewers.

The provisions of the Village Law bearing upon the same question are contained in section 128 of such law, in the following language:

"No contract shall be made involving an expenditure by the village unless the money therefor is on hand or a proposition has been adopted authorizing the board of trustees to raise such money."

It would seem to me that the Legislature must have had this section of the Village Law in mind when the amendment in question was inserted, and that the intention was to make a specific exception as to the raising of funds in either of the cases in question, and that, therefore, when the sewers are in fact insufficient to properly sewer the municipality, and a nuisance exists therefrom which endangers the public health, then the machinery can be put in motion for the abatement of the nuisance and the continuance of a proper sewer system and connections, whether the money be on hand or not.

It would seem advisable at this time, although the matter was somewhat fully discussed at your last annual meeting, to call your attention to the rule laid down by Mr. Justice Woodward, in Haag vs. City of Mount Vernon, 41 Appellate Division, 369, in reference to the abatement of nuisances by local boards of health. He says:

"This body is the local custodian of the police powers of the State, in so far as they relate to the public health; it is organized for the purpose of protecting the health of the community, and for this purpose it is given extraordinary powers, but they are all limited by the requirements of the public health, and every step beyond this limitation is an usurpation which the courts can not sanction. It may abate a nuisance of a public character, and it may exercise every power necessary to this end, and, as an incident of this power, it might make a permanent improvement calculated to prevent a recurrence of the nuisance, provided the work bears a legitimate and necessary relation to the abatement of the nuisance, but it can not go out into the domain of public improvements, levying arbitrary assessments upon adjacent properties, making the nuisance a pretext."

If you follow this rule, I think you will at all times be on the legal side of any question that may arise.

On the whole, the Senators and Assemblymen who sat in these legislative halls during the recent session constituted a thrifty body, as they recognized in the amendments to the Public Health Law that dollars were an essential element in carrying on the work, and that laws without the wherewithal to enforce them were like a ship without a rudder or a doctor without drugs. I think the percentage of the legal profession must have been large in this room last winter.

Section 26 has the following clause added:

"Whenever the suppression or removal of such nuisance or conditions detrimental to health demand the immediate expenditure of money, every such local board of health shall be authorized to use for such purpose any money in the hands of the board, or may call on the city council, village trustees or town board for such money, or it may borrow the same on the credit of the municipality. All such moneys so expended or borrowed shall be immediately repaid to the fund or source whence they were received on the recovery of the same by action or otherwise from the persons responsible for the expenses of suppression or removal."

Its design is clear, and it removes what must have been a great obstacle to success in preserving the public health, as in all public work, the lack of a sure and straightforward way of getting funds. As "money makes the mare go," there will now be no reason for delay or hesitation on the part of the health boards of the State on that account, and when a nuisance shows itself, don't be shy because you don't know where the money is coming from; for the laws of 1903 provide the way.

So much for chapter 383.

Chapter 468 of the Laws of 1903 is entirely new, and contains ten sections, numbered from 75 to 79-d, and is a part of the Public Health Law of the State.

The general purpose of the act is to prevent the contamination of the waters and streams of the State, and its scope and effect can best be told by quoting some of its provisions.

Section 75 reads as follows:

"No person, corporation or municipality shall place or cause to be placed, or discharge or cause to be discharged into any of the waters of this state, unless the same shall have been permitted by the state commissioner of health, any sewage, garbage. offal, dead animal, dead fish, dead bird, or part thereof, or any decomposable or putrescible matter of any kind or any substance, chemical or otherwise, containing the same in quantities injurious to the public health, from any shop, mill, factory or industrial establishment; unless express permission to do so shall have been first given in writing by the state commissioner of health as provided in this article, except as hereinafter provided. But this act shall not prevent the discharge of sewage from any public sewer system owned and maintained by a municipality, or the discharge of refuse or waste matter from any shop factory, mill or industrial establishment, provided such sewer system was in operation and discharging refuse or waste matter into any of the waters of this state at or prior to the time of the passage of this act, nor to any extension or modification of such shop, factory, mill or industrial establishment or reconstruction thereof, provided the refuse or waste matter discharged therefrom is not materially changed or increased; but this exception shall not permit any increase in the discharge of such sewage, nor shall it permit the discharge of sewage from a sewer system which shall be extended, modified or reconstructed subsequent to the passage of this act."

Section 76 gives the State Commissioner of Health the right to issue permits to public authorities to drain into waters of the State, provided only that in his opinion the public health will be subserved by the granting of such permit.

Section 77 gives the same authority as to industrial establishments; and in both cases the Commissioner may make rules and impose regulations in the permit issued, which permit shall in every case be recorded in the clerk's office of the county where the municipality or industrial establishment is situated, and also filed with the local board of health within whose jurisdiction such municipality or factory is.

Section 77-a requires the submission of plans by industrial establishments of carrying off waste and refuse to the State Commissioner of Health, and provides for a penalty of $5 per day, to be collected of the person putting in or constructing or maintaining the same, for each day such system is used for discharging refuse or waste matter into any of the waters of the State. Such penalty shall be collected by the State Commissioner, who may also maintain an action in the name of the people to restrain a violation of this section.

Section 78 gives the Commissioner power to revoke or change his permit at any time, upon proper notice therein prescribed.

Section 79 I will read in full, as it has to do with the duties of local boards of health, of which you are the mainspring. It is as follows:

"It shall be the duty of the public authorities having by law charge of the sewer system of every municipality in the state, from which sewer system sewage was being discharged into any of the waters of the state at the time of the passage of this act, to file with the board of health of the municipality within which any sewer outlet of the said sewer system is located, and within sixty days after the passage of this act, a report of each sewer system having an outlet within the municipality, which report shall comprise such facts and information as the state commissioner of health may require and on blanks or forms to be furnished by him on application. The board of health of each municipality being satisfied as to the correctness and completeness of each report submitted to it, shall within thirty days after its receipt certify the same and transmit it to the state commissioner of health. Such report when satisfactory to the state commissioner of health shall be filed by him in his office and shall constitute the evidence of exemption from the prohibition of this act. No sewer system shall be exempt from the prohibition of this act against the discharge of sewage into the waters of the state for which a satisfactory report shall not be filed in the office of the state commissioner of health, in accordance with this section."

Section 79-a provides for reports similar in their nature from industrial establishments, mills and factories.

Sections 79-b, as to the record of permits; 79-c, as to the procedure in case of violations of the act, and 79-d, for providing penalties for such violations, are all of importance to you gentlemen, and so I will read them.

"Section 79-b. Each board of health shall preserve in its office and in a form to be prescribed by the state commissioner of health, a permanent record of each permit issued by the state commissioner of health granting the right to discharge sewage or refuse or waste matter into any of the waters of the state within that municipality and of each revocation of a permit; and also a permanent record of each report received by the board of health concerning each sewer system and each shop, factory, mill, or industrial establishment which at the time of the passage of this act was discharging sewage or refuse or waste matter into any of the waters of the state within that municipality. Each local board of health shall make and maintain such inspection as will, at all times, enable it to determine whether this act is being complied with in respect to the discharge of sewage, refuse or waste matter or other materials prohibited by this act, into any of the waters of the state within that municipality. For the purpose of such inspection every member of such board of health, or its health officers, or any person duly authorized by it, shall have the right to make all necessary examinations of any premises, building, shop, factory, mill, industrial establishment, process, or sewage system.

"Section 79-c. The local board of health of each municipality shall promptly ascertain every violation of, or noncompliance with, any of the provisions of this act or of the permits for the discharge of sewage or refuse or waste material into any of the waters of the state herein provided, which may occur within that municipality. The board of health shall on the discovery of every violation or of noncompliance with any of the provisions of this act or of any permit duly issued, serve a written notice on the person or corporation responsible for the violation or noncompliance, together with a copy of this act and of the permit, if any, violated or noncomplied with, specifying the particular provision being violated or noncomplied with, and stipulating the length of time within which the violation or noncompliance must cease. If at the expiration of the stipulated length of time, the violation or noncompliance shall still continue, the board of health shall at once report the violation or noncompliance to the state commissioner of health who shall at once give a hearing to and take the proof of the persons charged with such violation or noncompliance and investigate the matter and if he finds a violation or noncompliance to exist he shall at once certify that fact to the board of health of the municipality, which shall immediately bring an action in a court of record, which action shall be tried in the county wherein the cause of action arose against the person or corporation responsible for the violation or the noncompliance, for the recovery of the penalties incurred and for an injunction against the continuation of the violation or the noncompliance.

" Section 79-d. The penalty for the discharge of sewage from any public sewer system into any of the waters of the state without a duly issued permit for which a permit is required by this act shall be five hundred dollars, and a further penalty of fifty dollars per day for each day the offense is maintained. The penalty for the discharge of sewage from any public sewer system into any of the waters of the state without filing a report for which a report is required to be filed with the board of health of the municipality shall be fifty dollars. The penalty for the discharge of refuse or waste matter from any shop, factory, mill or industrial establishment for which a permit is required by this act. without such permit shall be one hundred dollars and ten dollars per day for each day the offense is maintained. The penalty for the discharge of refuse or waste matter from any shop, mill, factory, or industrial establishment, without filing a report where a report is required by this act to be filed shall be twenty-five dollars and five dollars per day for each day the offense is maintained. The penalty for discharging into any of the waters of the state any other matter prohibited by this act, besides that specified above shall be twenty-five dollars and five dollars per day for each day the offense is maintained."

The whole purport of this act, the mark at which it aims, is to give to the Commissioner of Health of this State and his lieutenants, the local health officers and boards of health, complete control of all systems of sewage constructed hereafter in this State by municipalities and industrial establishments where such sewage empties into any of the waters of the State.

It would be presumptive of me to tell a gathering of medical men that the pollution of water is one of the most fruitful causes of disease, and from that fact, a system to check further pollution, to regulate and control systems of sewage already in existence can not but be a step up the ladder, which I hope in time will lead to well-nigh perfect sanitation in the great State of New York. Like any other new engine, its machinery will doubtless be found faulty in parts. It will slip a cog here and there and require a little lubricant in occasional places; but these things can only be discovered by actual tests; and my hope is that the lawmakers in future will be ready to furnish the new parts and the necessary lubricant for making the new machine turned out by the Legislature of 1903 a model of its kind.

I believe that legislative bodies everywhere are more and more awake to the necessity of safeguarding the lives of their constituents; and I want to say right here that the fact that these men who framed the laws have placed in your hands to a large extent this work is a compliment not alone to your ability but to your honesty and integrity which probably few of you have appreciated. Has it occurred to any of you gentlemen that the private practice in which you are all engaged might suffer if you too vigorously aided in the work of eliminating the cause of disease?

Here we have laws which make you (when every doctor among you is making a living by his private practice) the custodians of the public health, and that the confidence thus imposed in you is not violated is a fact which speaks louder in your behalf than any words of mine can do.

But to conclude, the Legislature of 1903 did their duty by their constituents more than their predecessors have done in several years.

In addition to the acts above set forth it passed several acts which have their bearing upon the health of the State. Of these, probably chapter 292, in terms an amendment of the Public Health Law, but which provides for the examination and registration of nurses, and chapter 179, which amends the Tenement House Act, are the more important.

I dislike to think that the last Legislature was influenced by any of the epidemics in progress during its session, notably those in Ithaca and Rochester, but the truth of the old adage that "When the devil was sick, the devil a saint would be; when the devil got well, the devil a saint was he," has been heretofore demonstrated, and if we are to have any epidemics this winter (which Heaven forbid), let us hope they will occur during the legislative session. In any event I believe the Senators and Assemblymen who passed the acts I have endeavored to outline are entitled to your thanks for what they have done.

Dr. Scott (of Kingston)—I would like to ask one question in relation to the appointment of health officer. Does a local board of health retain the power to stipulate a price as the condition upon which the local officer shall hold his position? I mean by that if they put a fixed price for him to do certain duties, including the treatment of contagious diseases, is he under any circumstances permitted to bring in additional costs or expenses without the knowledge and consent of the board of health?

Commissioner Lewis—I think, Doctor, that is a question that can be answered without referring to the question box.

Mr. Church—Doctor, I think this is the situation. I think the local board could, if they wanted to, make a contract with the health officer which would be binding upon him.

Dr. Scott—Thank you.

Commissioner Lewis—Before discussing this paper I have been requested to say that some of you gentlemen have apparently not registered. It is requested especially that they register when they leave the room.

Now that the meeting is firmly established on a running basis, we are ready to discuss the paper, if any gentleman wishes to discuss any feature of it. It contains so much, and what little he said about the appointment of health officers was said so much better than I said it. that I am glad he repeated it. There are a great many other things here which are worthy of discussion by this meeting. That is especially true of chapter 468. Now, chapter 468, if executed as some laws are executed, without discretion, sound judgment and a true appreciation of the situation, would be, in my opinion, one of the most revolutionary acts that was ever passed in the State of New York. Yet with proper knowledge of the requirements of the act and with proper influence exercised by the local health authorities, it will in time prove to be one of the most beneficent acts ever placed upon the statute books. We have discussed it in conference heretofore to some extent, and we have been discussing it in the Department ever since I have been connected with it, the best means of preventing the further pollution of the streams and waters of the State. We knew that it existed and that it was being increased rapidly from year to year by the growth of population of villages, towns and cities, by the great increase in industrial establishments; we knew, as you all know, that many a life has been sacrificed in the epidemics that have swept over sections of this State from this very thing, this pollution of the streams without any restriction. I do not doubt that the members of the Legislature appreciated the existing conditions last winter when this act was introduced. Senator Stewart, of Ithaca, introduced the bill and saw that it was passed, and we owe Senator Stewart a vote of thanks for the interest he took and the services he rendered in this behalf; but, as you will notice, its proper enforcement depends upon the local health boards, and we must depend here in the Health Department upon you for any report and every report as to whether the law is being complied with in your different localities, and it will add materially to your burdens as health officers in some cases. Up to the present time the requirement for reports has been complied with pretty generally, but certainly a great many industrial establishments and municipalities have not complied with the law as to filing reports, plans of sewers, etc. As I said a moment ago, our idea has been to put from now on a pressure against this further pollution of the waters of the State and keep it constantly applied until all further pollution ceases, and ultimately existing conditions will be remedied by public opinion, because when the public finds out they are being imposed upon by their own municipality, by having the stream that runs through or along the border of the village or city polluted, or through their park polluted, and understand the danger to life due to the lack of care, caution and prudence on the part of their local authorities, the local authorities are going to find a way to remedy it.

You notice that the law does not apply to conditions that have existed before the law was passed. That is a pretty well accepted theory of legislation, that you can not legislate upon conditions that existed prior to its passage. We never could have passed the bill at all if we were going to have it apply to things as they then existed, but the same result will be obtained provided you gentlemen become perfectly familiar with the law as it reads, with its every provision, and make it the business of your board of health to see that the provisions thereof are complied with in each municipality of the State. It seems upon first sight to be a somewhat cumbersome act as far as its enforcement is concerned, but I believe that experience will simplify the procedure under it, as we understand it, so it is a workable proposition. If defects require future legislation to correct them, I believe it can be remedied.

Excuse me for taking up so much of your time. I was waiting until some of you had a speech ready to make upon the paper. Does anyone wish to discuss the paper?

Dr. J. P. Heyen (of Northport)—Mr. Chairman, I want to state a case and ask your opinion. The whole question of polluted water is a very prominent one in my section on account of the oyster industry. The question has arisen in our place whether we ought to run a sewer into the waters of the bay. The health officer has decided that a sewer is absolutely necessary; the local board of health will not act on account of the expense and the trustees of the village are lukewarm in the matter. Now I would like to ask what is the health officer's duty in that situation?

Commissioner Lewis—The health officer, being an executive officer, can not act without the other boards, except, I believe, and have always believed, that the health officer's influence may finally clear up a situation of that kind. You need not be afraid to apply all the pressure you can bring to bear upon the board; you need not be at all afraid they will supplant you in office next year, you know, under the present law. It is a matter of public education, in other words.

I would like to hear from some gentleman on that question of the danger to the oysters, if there is anyone here who has anything to say on the subject.

Dr. Heyen—In that respect perhaps I am the only one here that is put in that position. I take it most of the gentlemen here are from the interior of the state——

Commissioner Lewis (interrupting)—They all eat oysters, you know. [Laughter.]

Dr. Heyen—They all eat oysters, that is very true. The question has arisen in our town whether the local authorities have the privilege or can arbitrarily empty a sewer into a harbor from whence oysters and clams are both taken. It is quite an industry and the question is whether the State would allow the pollution of the water. It is really in a situation—there is nothing else to do, there is no other way of running the sewer, the place is so situated it can not go in anywhere else.

Dr. Howell—I am not able to state my authority, but personally I am thoroughly impressed that the accepted fact is that the oyster is often contaminated by typhoid germs. Were I in the position of the health officer who has just spoken I should put my foot down squarely on any sewage being emptied into an oyster bed. Now Dr. Veeder of Lyons is here. He has made some study along this line and I would like to have his opinion on it. I am positive of it, though; I think it is accepted as authoritative that oysters are a source of infection from typhoid germs.

Dr. Veeder (of Lyons)—All I can say in answer to that is that there are cases reported of that kind, well authenticated. As regards the situation described, the question being between the oyster beds and the community along the shore, it is a choice of evils. It seems to me that very often that is the case; the thing that is fixed up one way will remove one source of trouble, fixed another way will remove another. A changing of the location of the oyster beds would be a way out of it probably in the long run.

Dr. D. C. Moriarta (of Saratoga)—I think the gentleman from Long Island, the position he has taken is pertinent. If the Commissioner of Health asks the local boards of health to do their duty, is it not the duty of the State to protect these industries? If there is no other way to run the sewer plant, let them do as we do it in Saratoga now. I don't think because there is no other way to dispose of the sewage by gravity, that the public generally should be made liable to infection. I think it would be the province of the State to interfere to protect the public generally.

Commissioner Lewis—I might give warning now that if Northport presents a system of sewers proposing to empty raw sewage into a bay containing oyster beds, it won't be approved. That much I can say now.

Mr. Church—It seems to me from a legal point of view the Commissioner has entire control of the situation now under the act of 1903, which I have read a large portion of to you. The plans must be submitted to him and he must approve of the plans after investigation before sewers can be legally emptied where oyster beds are in danger.

Dr. Heyen—I would like to ask if it has been settled, to be safe from pollution, as to how far the oyster beds should be from the mouth of the sewer? I speak of this because it is a very important question. You know we all eat oysters, and perhaps you may taste some from Northport some time.

Commissioner Lewis—Will any gentleman answer that question?

Dr. Moriarta—It would seem to me the question would resolve itself down to this: It should not run into a potable stream. If it runs into a bay where oysters and clams are, you can not regulate the location of the oysters. The sewer should not be allowed to run into the bay at all. There should be some other disposition of it than emptying into a running stream.

Commissioner Lewis—That would solve the whole trouble. Any further discussion concerning the paper which we have listened to? I might state again, if any questions arise which you would like to have answered, if you will send them up here they will be attended to in due time.

If I am allowed to speak for you all, I would tender to Mr. Church the thanks of the conference for the valuable paper he has given to us on the health law amendments. It is the first real exposition I have heard of them, and I am gratified to know that the Legislature did so well in that regard. I thank you very much, Mr. Church. [Applause.]

We now have the pleasure of listening to a paper on "Food Adulteration, Its Nature and Extent," by Prof. Willis G. Tucker. [Applause.]

FOOD ADULTERATION: ITS NATURE AND EXTENT, AND HOW TO DEAL WITH IT

As this paper will be comparatively brief, it may be said at the outset that no extended discussion of food adulteration will be attempted. Volumes have been written upon the subject and journals devoted to chemistry, medicine and hygiene not only, but even the popular periodicals and daily papers give much space to it. It is a subject upon which much popular misapprehension exists, but its importance is certainly such as to merit the recognition which it is receiving. To deal with the matter properly by legislation involves many and grave difficulties, and while admitting at the outset that I have no solution of the problem to offer I shall endeavor to indicate a few principles upon which it seems to me that restrictive measures should be based. And since our conclusions ought to be founded upon sound premises, it will be necessary to define adulteration, and distinguish those foods which are frequently adulterated from those which are not.

As regards foods, adulteration is often supposed essentially to consist in the wilful addition of some harmful, or at least distinctly objectionable, constituent. But an article may be adulterated if it be not properly purified or prepared, even if no addition has been made to it, and the intentional addition of foreign matter does not necessarily constitute an adulteration. And it need scarcely be said that the admixture of matter entirely harmless may be an adulteration. I am not concerned with verbal quibbles, nor attempting to frame a precise definition, but wish to make it plain that an article may be technically adulterated and yet entirely innocuous. Adulterated food is synonymous with poisoned food in many minds, and more rational ideas would prevail if this misapprehension were corrected. The phrase "pure food," so popular nowadays, would seem to owe much of its attractiveness to the belief that most foods are purposely adulterated or contaminated, and that absolute purity is desirable and practicable in all cases. As a matter of fact, however, many of our most important staple foods are ordinarily free from wilful sophistication, and absolute purity is generally impossible of attainment in practice.

Without attempting to frame any comprehensive and precise definition it may be said in a general way that adulteration may consist in the removal of a valuable constituent, as cream from milk or fat from chocolate, or the failure to remove some useless or objectionable constituent, as husks or shells from spices, or fusel oil in the restifying of liquors. It may consist in the addition of some cheaper or less valuable constituent as a mere filler or make-weight, or the addition of some actually harmful substance either as a substitute for some ingredient which has been extracted or as a flavor, color or preservative, and in general in the abstraction of any essential constituent or the addition of any foreign or useless substance. Some adulteration is reprehensible, therefore, because it results in an injury to health, and other practices are to be condemned because they are commercially fraudulent since they lower the real value or enhance the price of the article sold. It is essential to make distinctions here if this matter is to be intelligently discussed, and also to remember the fact, already stated, that real and absolute purity in any chemical sense is seldom obtainable, or even desirable, in the case of foods, notwithstanding much nonsense which we hear to the contrary. Many illustrations of the difficulties which attend the popular discussion of these matters, and even the framing of precise definitions and the establishing of standards of purity, might be given, but one will suffice. Maple sugar owes its essential sweetness chiefly to sucrose and if properly purified or refined would be indistinguishable from pure cane sugar, but its characteristic flavor and commercial value depend upon the presence of substances derived from the sap which constitute impurities in sugar as otherwise judged. But beet sugar unless its attendant impurities are removed would not be palatable or even edible. We demand, therefore, in the one case that the article should be impure, and in the other that the impurities should be removed. It is essential in all discussion of these matters that such facts be kept in mind if we would avoid hasty generalizations and misdirected emphasis.

There are probably few articles used as food which have not been at some time, or are not now at times, adulterated or sophisticated in some manner, but we shall have little difficulty in distinguishing those common foods which are frequently adulterated in an objectionable manner from those not ordinarily so treated. Among foods liable to adulteration may be named, under animal products, manufactured or prepared meats, including fish of all kinds, comminuted or whole, potted or canned, flavored, spiced or otherwise treated, and milk and dairy products generally. In the case of these articles valuable constituents may be removed; cheaper material added, and objectionable coloring matters and preservatives may be employed. Under vegetable products, canned and otherwise preserved fruits and vegetables, syrups, candies, spices and flavoring extracts, salad-oil sold as olive oil, cocoa preparations and vinegar are frequently sophisticated or adulterated. On the other hand, fresh meats and fish foods, and ordinary salted, pickled and smoked meats and fish not compounded or manufactured; the staple cereal products, fresh vegetables and fruits, refined sugars, tea and unground coffee, are generally free from adulteration, and in the same class should be included the commoner fermented and distilled liquors, although a different view is very generally entertained. But since this general statement may seem too sweeping, it may be well to be somewhat more specific, although our time will not admit of detailed treatment of so large a matter.

In no country is fresh meat more largely eaten, even among the poorer classes, than in this, and it is so generally of good quality that I need not refer to the exceptions. And the same may be said of fish, shellfish and the like. Where these are procurable at all they are ordinarily of good or fairly good quality. And so also of the ordinary salted, pickled and smoked animal foods, for while preservatives like boric acid, "liquid smoke" and similar substances, are sometimes used in the preparation of these articles, by far the larger part of the salt pork, hams, mackerel, codfish and other like staples in our stores are of good and wholesome quality. But in the case of potted and canned animal foods, and such manufactured meats as sausage and the like, the case is different. Substitutions of various kinds occur here which are commercially fraudulent, and colors and preservatives are employed which may be by no means unobjectionable.[1]

Many of these foods, however, are high-priced and used chiefly as relishes and the total amount of all such foods consumed while doubtless large, forms but a small proportion of our entire consumption. Coming now to dairy products, we note that milk is largely watered, often suffers a loss of fat, and that preservatives are frequently added. Butter and cheese are variously manipulated and sophisticated, but many of these evils have been checked by Federal and State legislation and an enlightened public sentiment, which has done much to render the enforcement of restrictive laws possible, and as a result good and wholesome articles of this class are generally procurable if the purchaser is willing to pay a fair price for them. Of canned and otherwise preserved vegetables and fruits enormous quantities are consumed, and while a great deal of rubbishy stuff is put up, and preservatives often used as well as artificial coloring agents, the larger part of these articles are unobjectionable from a sanitary standpoint and the canner's art has been of inestimable service to the people. On the whole, I think that in this trade there is a disposition to respect the laws which have been enacted and that the quality of these articles is improving rather than the reverse. The dangers arising from metallic impregnation have been very greatly exaggerated.[1]

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[1] The Inland Revenue Department of Canada, Bulletin 85, under date of June 10, 1903, reports upon the examination of 99 samples of canned meats. All but 5 were in good condition and all were tested for preservatives, and boric acid, probably added in part as borax, detected in 21, but it is stated that in no case did the amount exceed the limit fixed by the British Parliamentary Commission—viz. 0.5 per cent—and in most cases it was markedly below this amount. Many of the samples examined were put up by Amercan packers.

As regards cereal products it may be said that these are so cheap as to be seldom adulterated in this country. Some years ago wheat flour was quite extensively adulterated with a finely ground preparation of Indian corn known as "flourine," but the passage of a revenue act taxing and requiring the branding of mixtures of this nature practically put an end to the practice. In foreign countries the adulteration of fine flours and meals in various ways is by no means unknown, but in this country at the present time such sophistication is seldom met with. The same may be said of bread, crackers, breakfast foods and like articles. The use of alum, mineral make-weights and other adulterants is so rare as to require no notice. Some special foods, like arrowroot, gluten flours, so called, and gluten breads, may not be as claimed, but our cereal goods are generally of good quality and satisfactory purity. Fresh vegetables and fruit form an important part of our food supply and are often sold in our markets in an unripe, stale or even rotten state. Tons of such articles are confiscated and destroyed in our cities every summer, but this matter lies outside the scope of our inquiry, nor are such foods adulterated in any ordinary sense.

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[1] The Inland Revenue Department of Canada, Bulletin 87, under date of July 14, 1903, reports upon the examination of 100 samples of canned vegetables, including peas, corn, tomatoes, beans, beets and asparagus. All but 2 were in good condition, and in none was any preservative found. Traces of copper were discovered in 2 of the 27 samples of peas examined, but it is stated that there is no evidence to show that these traces mean any intentional addition of copper, which is believed to be normally present in some peas. Copper is commonly added to imported French peas for the purpose of fixing the natural color, but it is seldom employed by packers in this country.

Saccharine substances form an important class of foods and the higher grades of sugar are furnished in a state of remarkable purity. Whether extracted from sugar cane, beets or sorghum, if properly refined, the product is the same, and the dangers said to lurk in the presence of ultra-marine and tin-salts are so remote as to be scarcely worth considering. Moist and brown sugars, molasses, syrups and maple sugar and syrup have been more or less largely commingled with grape sugar and glucose syrup, but such adulteration, except in the case of maple products, is much less common than formerly. The cheaper grades of confectionery are largely made up of grape sugar, starch, mucilaginous substances and gelatin, in themselves unobjectionable, but they sometimes contain paraffin, clay, sulphate of lime, and objectionable flavors and colors. Fusel oil has been found in "rock and rye drops," but fortunately the use of such deleterious substances is not common. Jams, jellies and marmalades are often fictitious mixtures compounded with glucose, gelatin, and artificial flavors, variously colored and frequently containing preservatives, but poor as they are, and misleading as may be their labels, they are not always necessarily unwholesome and the purchaser can generally tell with fair certainty what he is getting.

Tea and coffee may be briefly dismissed. The Federal inspection laws keep out most of the rubbishy tea that used to be imported, and the search for foreign leaves, and exhausted leaves made over, is like looking for the proverbial needle in the haystack. The evils resulting from facing and coloring have been much harped upon and constitute part of the stock in trade of many overzealous though misinformed enthusiasts, but the evils alleged have been greatly exaggerated. Good tea, entirely genuine, can always be obtained nowadays at moderate prices, and the same may be said of coffee if purchased whole. Artificial coffee beans have been made and sold, but at present prices are seldom seen and if met with may be easily detected. Even ground coffee is now commonly ground at time of sale and is therefore ordinarily unadulterated, and the various brands of cereal coffees, sold in packages, do not pretend to be coffee at all and no one need be deceived in buying them. Chicory is often added to ground coffee, but generally in response to a demand rather than as an adulterant, and it can not be considered as harmful. There are all grades of coffee, from the best to the poorest, but there is little adulteration which would deceive any one of ordinary intelligence desirous of obtaining real coffee. In the case of spices, however, the conditions are very different, and while genuine spices are not difficult to obtain a large part of those sold, especially in the ground state, are of inferior quality or adulterated with foreign matter. The manufacture of these adulterants is in itself a large industry, and while the substances employed for this purpose are in themselves harmless the fraud is not one which should be condoned. But this matter is so generally understood that we need give no more time to it.

Flavoring extracts also are very largely adulterated and frequently entirely fictitious. Very little of the vanilla extract now sold is made from the real bean, synthetic vanillin, and generally coumarin also, being employed in its manufacture. These substances are innocent enough, but an extract so prepared lacks the fine flavor which the true vanilla bean imparts. Lemon extract should be made from real oil of lemon, lemon peel and deodorized alcohol, but much of the stuff which masquerades under its name contains so little oil that it is scarcely recognizable and it is frequently entirely fictitious. It has also been shown that wood-alcohol, which is distinctly toxic, is sometimes used in its preparation. Aside from these articles other flavoring extracts used in the household, and by bakers, confectioners and makers of ice-cream, sodawater, syrups and soft drinks, are largely made from artificially prepared fruit essences, skilfully compounded, but we may derive comfort from the thought that most of these substitutes are comparatively innocuous in the quantities in which they are used.

Olive oil, as is well known, is very liable to adulteration and much that is sold consists entirely of cotton-seed, arachis, or other seed oils. Lard oil is sometimes used as an adulterant, but none of these are objectionable from a sanitary standpoint. Clearly, however, they should be sold upon their merits and not under false colors. Cocoa preparations often have an undue proportion of fat removed and frequently contain excessive quantities of sugar, starch or other make-weights, but until such time as definite standards have been set for these articles it is not easy to draw the line between those which should be called adulterated and those entitled to be ranked as pure. We have found that the best known brands are generally of satisfactory quality. Vinegar is an article very likely to be adulterated by the addition of water, and, under the name of cider vinegar, spirit vinegar, commonly known in the trade as white vinegar, is often sold, but in this State our Vinegar Law has been in operation for a good many years and has operated pretty satisfactorily. The adulteration of vinegar with mineral acids is practically unknown, and so far as wholesomeness is concerned it is immaterial whether the vinegar we use be made from cider, malt or whiskey. Indeed the diluted acetic acid of the United States Pharmacopoeia, containing 6 per cent of absolute acid, would perhaps be preferable to anything else, and the late Dr. E. R. Squibb once told me that he employed it upon his table in preference to vinegar.

We can not take time to dwell much longer upon specific adulterations, but before leaving the matter I want to say something concerning fermented and distilled liquors. It is the common notion that these are very largely adulterated, and that cheap beer and low-priced whiskey are particularly noxious, but such is not in reality the case. There is plenty of blending, watering, flavoring and false labeling, more especially in the case of wines and imported liquors and cordials, but upon these I shall not dwell. Domestic malt liquors and whiskey are the real staples here and concerning these a few words may not be out of place. In the brewing of malt liquors glucose and other substitutes for malted barley, such as unmalted cereals, are often employed, but these substances are in themselves harmless and the notion that foreign and poisonous bitters are employed in place of hops rests upon very slight foundation in fact.[1]

Preservatives are very frequently used in bottled beers, but most draught beers are free from harmful adulterants as sold, and in the absence of definite standards can seldom be termed adulterated at all. In 1897 Dr. E. J. Lederle, now commissioner of health in the city of New York, at that time chemist to the Department of Health, examined five samples of beer purchased on or near the Bowery in various places where sold for 3 cents a glass. Dr. Lederle has kindly furnished me with an abstract of his report, which has never been published, and this report states that each sample was in good condition when purchased, containing the usual amount of carbonic acid gas and no excess of yeast, and that none of them contained any other bitter than hops nor were any injurious ingredients found present, and in his opinion no cause for complaint existed. These results agree with those reported by most other reputable analyses during recent years. Now, concerning domestic whiskey, which is probably consumed in this country more largely than all other distilled liquors combined, I believe the facts to be as follows. Genuine whiskey may ordinarily be easily obtained at fair prices. Its chief adulterant is water. Caramel is always added to color it and different whiskies are often blended, or mixed with wine, as sherry, to improve the flavor, and syrup or rock candy, glycerin and the like are not infrequently added. Whiskies so treated may not comply with the requirements of the Pharmacopoeia as to total solids and nature of same, percentage of alcohol, etc., but none of these additions are in any respect harmful. But much cheap whiskey is either insufficiently aged, and as a result may contain an undue amount of fusel oil, or it is purely artificial. Whiskey is now made on quite a large scale from cologne spirits, which is diluted with water to proof strength or much below it, colored with caramel, flavored by the addition of some real whiskey, or with oils and essences sold for the purpose, and often sweetened or softened by the addition of syrup or glycerin. Such articles are spurious but not necessarily unwholesome and they may be, and often are, much less objectionable than new or improperly matured liquor. The essential stimulating and intoxicating constituent in all liquors is alcohol, and this substance, no matter how prepared, if pure, is the same. Common alcohol of 94 per cent by volume, or 188 proof, may contain sufficient fusel oil or other impurities to affect its odor and taste, and is not found to give satisfactory results in the compounding of liquors. Cologne spirits, which is a purer distillate and much more suitable for the purpose, is therefore universally employed. If this be properly diluted it is in no respect more deleterious than whiskey is. In the course of the investigation made by Dr. Lederle, already referred to, he found that manufactured whiskey made from cologne spirits, diluted, colored by caramel, flavored by so-called whiskey-oil or essence, and sometimes containing prune juice, sugar or glycerin, was very largely sold in places where cheap whiskey is dispensed. He collected 20 samples of whiskey from places where it is sold at 3 cents per drink, of one ounce, and as a result of his examination, which was thorough, it appeared that almost all were artificial. In his conclusions he says: "In no case was the amount of fusel oil excessive. No injurious ingredients were found in any of the samples. An artificial whiskey made from pure cologne spirits, about proof, colored by caramel and flavored by a small amount of a noninjurious essence is probably less injurious to the system than a genuine new whiskey of the same alcoholic strength, containing 0.25 per cent by volume or over of fusel oil." And he concludes by saying: "There is no cause for complaint." The samples examined varied in alcoholic strength from 30 to 50 per cent by volume, averaging 41.5 per cent, while the Pharmacopoeia requires from 50 to 58 per cent, so that they were greatly deficient in real strength. The fusel oil determinations were very interesting. Nine samples contained only a trace (that is, less than 0.01 per cent); six contained 0.10 per cent or less, and five contained between 0.10 and 0.19 per cent, while a genuine new whiskey examined yielded 0.35 per cent. Although no definite standard of the amount which should be allowed has been generally agreed upon, he is of opinion that 0.20 or 0.25 per cent is the maximum which should be present in good liquors, and none of the cheap manufactured whiskeys which he examined contained as much as this. In refutation of the claim that cheap whiskey must necessarily be made from deleterious ingredients he makes a simple calculation to show that such whiskey as he collected, and which sold by the pint at an average price of 24 cents, need cost but about a dollar a gallon, and that when sold at 3 cents a drink of one ounce the gross profit on each gallon so sold would be $2.84, or nearly 300 per cent. All samples were tested for poisonous metals, but none were discovered, nor were any traces of capsicum, mineral acids or other injurious substances, commonly believed to be used in such liquors, detected. And I may add that I have examined from time to time during recent years many samples of whiskey for the Department of Health, and that while samples occasionally fall considerably below the Pharmacopoeial requirement as to alcoholic strength, no deleterious constituents have been discovered. I think therefore that we are not justified in saying that cheap whiskey is necessarily harmfully adulterated, since as a matter of fact its chief adulterant is water.[1]

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[1] In 1886 Dr. Engelhardt of Syracuse, examined 477 samples of beer for the State Board of Health, and no hop substitute was detected in any sample.

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[1] Many of the older English works on food adulteration refer to fusel oil, methyl alcohol, creosote, mineral acids, capsicum and the like, as if they were frequently used in adulterating spirits, but as a matter of fact they are seldom so employed. Thorpe (Dict. of Applied Chem., 1, 38) says: "Although it has been stated that spirits, especially gin, were formerly adulterated with capsicum and even sulphuric acid, in order to increase their fiery character, it is satisfactory to find that in the working of the Food and Drugs Act no evidence has been afforded of such practices during late years. The report of the Local Government Board, 1885, after referring to the fact that one-fourth the samples submitted for analysis were diluted below the standard, adds, 'it is satisfactory, however, to find that water is the only adulterant employed.'"

Before leaving this subject I may add that the Bottling in Bond Act, passed by Congress in March, 1897, enables purchasers who desire to procure genuine whiskey, matured for four years or more in bonded warehouses, to obtain it under what amounts in reality to a government guarantee, for the stamp issued by the internal revenue department and affixed over the cork gives date of production, name of distiller and location of distillery, proof strength, measure of contents and date of bottling. Under the admirable provisions of this act those who wish to protect themselves against commercial fraud and deceptive advertisements and labels may do so without much trouble.

Of the use of coloring agents and preservatives I do not purpose speaking at this time. These substances as used are frequently adulterants, and in a report upon food colors made to the Legislature in 1900, and published in the Twenty-first Annual Report of the State Board of Health, I discussed the subject at some length and gave the results of the examination of a number of the more important articles which are sold for this purpose. And at our last sanitary conference I gave some account of food preservatives in a paper upon the subject which I read on the first day of the meeting. I shall therefore make no further particular reference to these forms of adulteration at this time.

We come now to ask in conclusion, and briefly, How shall this matter of food adulteration be dealt with? Many people have great faith in legislation. They believe that all abuses may be corrected and people made moral by the passing of laws. Perhaps I have less confidence in legislation as a remedy for some of the evils that affect our body politic than many of my friends have and this much at any rate seems to me certain, that it takes wise men to frame salutary laws, and efficient and judicious officers to enforce them. It may be that we have had too much lawmaking in some directions, and it is very certain that the widely differing statutes relating to our food supply in the different States have worked much mischief, been the cause of much confusion, and seriously embarrassed some useful industries. I think all who have studied the matter will be inclined to admit that uniformity in our food laws is much to be desired, but how this may be secured, and how our statute books may be freed from many senseless provisions which now encumber them, are questions not easy to answer. Federal aid has been invoked, but the general government can not deal with the problem directly under our constitution since each State has jurisdiction in all such matters in its own territory, and I can not view with favor such wrestings of our interstate commerce laws and revenue laws as have made them instruments for attaining ends which they were never designed to accomplish, laudable though these may be. Well inspired as have been the efforts which have been made in these directions, and notwithstanding the fact that some of the results obtained have been both desirable and salutary, I still think that the principle is wrong because constitutional rights guaranteed to the State are interfered with. To many it is a mere matter of expediency, and in the view of such, the end justifies the means, but I can not think so. In my opinion the States must deal with these problems just as they frame their own marriage and divorce laws, banking laws and those governing the sale of liquor and the like, and if confusion and complications result the trouble lies in our political system and ought not to be remedied by any subterfuge, however plausible or ingenious the method, or desirable the end sought to be obtained.

Now it is an encouraging fact that we find of late years a disposition to enact measures in one State which have operated satisfactorily in others, and I believe that as this matter of food adulteration is more fully discussed, and placed upon a better scientific basis, there will be evolved more satisfactorily laws than any now upon our statute books, and that these, if found to operate beneficially, will in time be adopted in most of the States. The work of the United States Department of Agriculture, of the Association of Official Agricultural Chemists, of the National Association of State Dairy and Food Departments, and of other congresses and conferences such as that we are now holding, has been productive of much good, and through such efforts we may hope that rational legislative measures will eventually be evolved.

Restrictive legislation may be based on one or the other of two general principles. The use of harmful, deleterious or poisonous articles may be prohibited in general terms, in which case it rests with the State to prove the objectionable quality of the article complained of, which is often difficult and may be impossible; or the sale or employment of various and specific substances may be forbidden, but the difficulties involved in making a list which shall be correct and complete are so great that any man or body of men may well shrink from attempting it. The subject is intricate and perplexing and, as stated at the outset, I have no general solution to offer, and can only state a few points which it seems to me should be borne in mind in discussing it.

First. Unnecessary legislation should be discouraged. Every year we have bills introduced in this State forbidding the use of coloring agents, preservatives and poisons, in dairy products and other foods, and we have pure beer bills, and canned goods bills, and others of like nature which are either duplications of existing laws or otherwise unnecessary, or introduced in the interest of some individual or industry. This is a growing evil and needs correction. And if, through excess of zeal and in a vain endeavor to secure ideal purity in our foods, we interfere with justifiable manufacturing processes, we are hampering trade and may increase the cost, or injure the quality, of commodities. In the present state of our knowledge we should be very cautious in either enacting or endeavoring to enforce laws which in any wholesale way forbid the use of food preservatives. I use this only as an illustration, for the same caution should be observed in many other directions, and we ought not to be influenced by the prejudices and ill-formed opinions of overzealous enthusiasts. Some of these will make a great pother about the recent exclusion of a small consignment of French white wine and a few other articles at the port of New York under the law passed by Congress last March as a rider on the Agricultural Appropriation Bill. This law prohibits the importation into this country of any article of food or drink made in violation of the laws of the country in which it originates, and its general intent is no doubt good, though I should not be willing to concede that we are bound to approve all the adulteration laws which have been passed in other countries. On the contrary, I maintain that we must set our own standards, and if the sale of an article is forbidden in France or Germany which we deem to be unobjectionable I can see no reason, other than some possible political one, why we should exclude it. Now without entering into any discussion of the question as to whether salicylic acid, which it is stated was contained in this excluded wine, should or should not be added to any kind of wine, it is evident that the matter is not one of very great importance and ought not to be unduly magnified. Probably not one person in ten thousand in this country habitually uses imported white wine upon his table. The vast majority of our people therefore are not greatly interested in the matter and care much more about pure milk than they do about pure French wines.

Second. So far as possible we should endeavor in framing food laws to define articles precisely, and prescribe definite standards of quality or purity to which they shall be required to conform. This will often be difficult, as, for example, in the case of cocoa preparations, where many commercial grades are prepared from the same natural product; but it is often entirely practicable. In the case of articles like milk and vinegar, where definite standards have been adopted, it has been found in practice a comparatively easy matter to enforce the laws regulating their sale, and there has been little complaint of hardship or injustice resulting from their enforcement. Principles applicable in the case of drugs may be fairly extended to foods, and in the precise definitions and standards of purity and strength of the United States Pharmacopoeia we have a model which, so far as possible, should be imitated in framing food laws.

Third. There are few articles likely to be employed in foods the use of which under all circumstances should be absolutely prohibited. Take the case of boric or benzoic acid and their salts, or even of salicylic acid, for example. I do not think that their use should be absolutely prohibited, but am of the opinion that the articles to which they may be added should be listed, and the quantity permitted to be employed in such articles definitely stated, and that the law should require the fact of such use to be stated upon the label. I favor such legislation because I do not think that in the present state of our knowledge we are justified in saying that such substances are, of necessity, harmful in all cases and I am not very sanguine that such experiments as Dr. Wiley has been recently conducting with a view to determining the effect upon health of antiseptics used as food preservatives will yield very conclusive results. Experiments on the "poison squad" will doubtless add to our knowledge, but they can not be expected to settle all questions now under discussion.

Fourth. Proper and honest labeling of food articles should be encouraged and, so far as practicable, required by law. The advantages of precise definitions and the establishment of standards have been referred to, and since there is no reason in demanding that all food shall be of first quality, and even skimmed milk has right to be sold on its merits, it is evident that different grades of quality may be established by law, and the public, which does not expect to buy first quality goods at the price of seconds, would soon come to understand this matter. I think it would be approved by manufacturers also, and that no reproach would attach to articles plainly branded as of this or that grade, with reference to the law in the case, and openly sold on their merits. A properly applied method of classifying and branding food articles would dignify many products now commonly regarded as spurious, and sold under false pretenses, which are really entirely unobjectionable from a sanitary standpoint. If an article like extract of vanilla, for instance, made from vanillin was sold under legal provisions and properly labeled, many difficulties now confronting those who desire to execute our present laws impartially would be removed, all manufacturers would be placed upon the same footing, those who desire to obtain an article made from vanilla beans might obtain it, and the rank and file of the public, who are satisfied to use an article nearly as good and fully as wholesome at a lower price, might get it without suggestion of any imposition. I believe that most large manufacturers are anxious to comply with all reasonable provisions of law, and I think that the way to encourage them in so doing lies not in the direction of impracticable standards of purity, and the prohibition of all imitation and substitution, but in the establishing of definite grades of quality for different articles, and requiring that this grade shall be plainly stated. This view may seem impracticable to some who think that all manufacturers are rogues, and all trade a cheat, but such is not the case. There is much more commercial honesty abroad in the world to-day than there was half a century ago. Goods are more frequently sold as represented than they used to be, and such warrants as "all wool," "fast color," "full count" or "full measure," are more generally true to-day than ever before. And so it ought to be in the case of foods, and in many cases really is. And if we had fewer food laws, and if those retained were more rational, comprehensible, equitable, and easier of enforcement, there would be less deception and less cause of complaint on the part of the public. I live in the confident hope that our latter-day agitation of this important matter may lead to a better understanding of it, and that on this better understanding more rational methods of dealing with the problems involved, some of which we have discussed, will be based.

Dr. W. E. Johnson (who had taken the chair during Commissioner Lewis's temporary absence therefrom)—This paper is now open for discussion, and a very able paper too, and one of very much interest. I think that I agree very much with the sentiments expressed in it. I know very well that it relieves us in a measure of a false impression in many respects that has been heretofore entertained not only by myself but others. It calls to my mind a manufacturer of maple sugar in a western State who made it out of corncobs. It seems surprising, but nevertheless I am well informed that the firm became immensely rich, taking the corncobs and boiling them and adding thereto a certain amount of brown sugar and I am told it could not be detected from the genuine article. I know of no harm coming from the use of it. Are there any gentlemen here who would like to discuss this paper of Dr. Tucker?

I would like to have some gentleman make a motion for a vote of thanks to Dr. Tucker for the able paper he has read and for his courtesy. I desire to do so personally. If there is no further discussion upon this subject, we will pass on. Would any gentleman like to say something on the merits of the paper?

Dr. Purdy (of Seneca Falls)—I want to say that it does not seem right that we should pass by without a vote of thanks to Dr. Tucker. I know there are twenty or thirty men here who would have been glad to have had the privilege and in fact were on the point of making that motion. It seems to me this meeting should express its thanks to him for his able paper, and I would like to make a motion to that effect and I would like to have it seconded.

The motion was seconded by several.

The motion was then put and carried unanimously.

Dr. Johnson—I will now call upon Prof. O. H. Landreth, who will read to us a paper on "School Sanitation".

SCHOOL SANITATION

By Prof. O. H. Landreth, Consulting Engineer, New York State Department of Health; Dean of Engineering School, Union University.

In approaching this subject to-day I am at a loss to determine which impresses me most; the critical importance of the matter of proper sanitation in its bearing on both physical and mental development; or, the richness of the present opportunity to affect both home and school through these assembled sanitary officers, each of whom is in position to exert a peculiar and widespread influence. I can only wish that what I have to say might in some small measure correspond in value to both topic and occasion.

The subject and the assemblage do not admit of an arbitrary treatment; sanitation is no longer empirical, but has acquired a scientific basis, and it would poorly harmonize with the intelligence of New York State health officials to discuss the matter in hand in any other than a fundamental, rational manner.

Before advancing let me frankly assure you that I have nothing startling and little that is new to offer; I am not here as an investigator to offer the fruits of my own researches, but rather as a plain worker to emphasize the need of more systematic effort in putting into effect the established principles of sanitation as they bear on school conditions and training.

Any intelligent, rational treatment of the subject must of necessity be based on a clear understanding of the modern conception of health and disease and especially the true nature of the latter.

Health may be defined as that condition of the body and its organs which conduces to an efficient and extended life. The human being, like all other living organisms, finds itself at all times exposed to the influences of two general classes of agencies and conditions, namely, those which are favorable and those which are unfavorable to health. It is the function of *hygiene* to develop and promote the former, and of *sanitation* to minimize the latter.

A perfect human mechanism would be one whose every organ was so carefully and perfectly adjusted in strength and durability to the life task imposed on it that each should perform its function unimpaired to the last and fail only in unison with all its coordinate members. But such organisms are rare.

Prof. William T. Sedgwick, in his excellent work on the " Principles of Sanitary Science and Public Health ", states that 45,108 deaths were reported as having occurred in the State of Massachusetts during the year 1890. Of these

	Per cent
Disease caused	92
Violence, accidents and drowning caused	4
Old age caused	4
Sum total	100

In our own State of New York for the five years ending January 1, 1903, the average number of deaths per annum has been 123,544. Of these the reports of health officers show that

90.2 per cent were caused by disease;
5.4 per cent were caused by violence, accidents and drowning; and
4.4 per cent were due to old age.

100 per cent.

These statistics indicate that, in Massachusetts and New York at least, only one death in twenty-five is attributed to old age and that more than nine out of every ten persons die from disease.

These statistics do not, however, fully represent the influence of old age, since many deaths which are directly caused by disease and are so attributed, would not have occurred at all or would not have ended fatally but for the declining vigor and diminished resistance due to advancing years. In other words, disease in these cases was not the sole nor necessarily the principal cause of death, but rather its immediate or incidental cause. While death in these cases would not have occurred but for the diminished powers, death also would have been deferred had disease not been present as an incidental cause. Disease rather than old age may therefore still be considered as playing a major part as a cause of death.

The foregoing statistics also show how far we are from the ideal of human physical efficiency. Oliver Wendell Holmes's " Deacon's Masterpiece " has long been the engineer's ideal model in constructive design; the acme of the economic distribution of material and strength in inanimate structures; but Prof. Sedgwick also appropriately applies the parable to the human body. He comments and quotes as follows:

" Death is the final stoppage of the living mechanism; but while theoretically this comes only when all parts are worn out and as the simple, natural cessation of function from sheer and general debility of each and every organ, it does not in fact come very often in this way. The machine breaks down; it does not wear out. Some organ or part gives out comparatively early, and by failure to do its part destroys the whole.

"Facts like these may or may not have inspired the author of the 'One Hoss Shay,' who, in his famous poem has described the building of the body; its defects of constitution and construction; the ordinary cause of its death; and finally, the theoretic possibility of so making a living body that it shall die at last because it is worn out, namely, from old age. In the person of the Deacon, the Autocrat, himself a physiologist, has consciously or unconsciously stated the case as follows:

"'Now in building of chaises, I tell you what,
There is always somewhere a weakest spot,—
In hub, tire, felloe, in spring or thill,
In panel, or crossbar, or floor, or sill,
In screw, bolt, thoroughbrace—lurking still,
Find it somewhere you must and will,—
Above or below, or within or without,—
And that's the reason, beyond a doubt,
A chaise *breaks down*, but doesn't *wear out*.'

"His remedy for this unfortunate state of things was,

"'Is only jest
T' make that place uz strong uz the rest.'

"Accordingly the Deacon proceeds to build his masterpiece in such a way that,

"'For the wheels were just as strong as the thills,
And the floor was just as strong as the sills,
And the panels just as strong as the floor,
And the whiffletree neither less nor more,
And the back crossbar as strong as the fore,
And spring and axle and hub *encore*.'

"With the result that after a whole century of life, though there were indeed

"'—— traces of age in the one-hoss shay,
A general flavor of mild decay,
But nothing local, as one may say.'

"And when the end came from sheer old age,

"'——it went to pieces all at once,—
All at once, and nothing first,—
Just as bubbles do when they burst.'

"Such is old age: the low-burning flame which flickers and finally goes out; the ripened fruit which drops heavily to earth; old mechanism, which, after long years of service, finally refuses to work, simply because it is worn out."

This is our ideal. How may we attain it? Through hygiene and sanitation employed continually, but primarily and particularly during childhood. We can not make a carriage fine and durable after it is built. It was in the building and not in the use that the "One-Hoss Shay" received those admirable qualities which made it the "Deacon's Masterpiece." Neither can we make an efficient human individual by deferring consideration of his physical welfare until after he has reached mature life. The physical qualities which make the human mechanism a masterpiece must also, as in the building of a chaise, be imparted during the period of development. It has been said by some of the more ardent advocates of the doctrine of heredity that the period of development and training of a child begins a hundred years before its birth. If this be true, we should not be discouraged by fear of having commenced too late, but rather encouraged by the far-reaching influence, even to future generations, of present efforts and activities.

Where *one* result is attainable in making a carriage perfect, *two* may be accomplished in developing an efficient human mechanism. However perfect a masterpiece the Deacon's carriage may have been, its capacity did not extend to a conception of the principles of good carriage-making, and it was clearly incapable of taking care of itself, both of which the intelligent, properly trained human individual can do. There are hence two distinct classes of results to be derived from school sanitation which may be classified under the heads of *execution* and *instruction*.

The former would include the creating and maintaining of proper sanitary conditions and safeguards about the school; the latter would cover proper instruction in the fundamentals of hygiene and sanitation as a part of the child's life equipment with which to combat disease and give old age a chance.

What may we say of executive sanitation?

During the period of school age, children are peculiarly susceptible to many forms of communicable diseases and they are also readily affected by unfavorable predisposing influences; they may thus become the medium of dissemination of communicable diseases throughout their district, and their constitutional vigor and resistance to disease may be impaired even where no specific disease is contracted. It is therefore of the highest importance not only that this free dissemination of communicable diseases which school intercourse offers should be interrupted and prevented as much as possible by vigilant school inspection, isolation and disinfection, but also that the physical conditions which surround both children and teachers at school should be kept hygienically favorable.

The available agencies to effect these results are, in the main, as follows:

(1) State regulation of the design and construction of all school buildings, which would bring about proper structural conditions of floor-space per capita, ventilation, lighting, water-supply, sewerage, fire-protection and fire-escape, and the selection of proper materials and finish for wall surfaces, ceilings and floors to insure the best sanitary conditions and render possible and easy the thorough disinfection and fumigation which should be a required feature in the sanitary maintenance of the building.

(2) A systematic, frequent inspection of all school buildings by municipal health officers, looking toward the maintenance at all times of sanitary conditions in and about the buildings.

(3) A system of frequent and thorough disinfection and fumigation of school buildings in conjunction with thorough and prolonged airing during the night-time and while the buildings are vacant.

(4) An extension to all schools of the system of daily medical inspection of pupils which has proven so successful in many city schools, the inspectors being under the direction of and reporting to the municipal health officer. To minimize the labor and cost of this medical inspection as well as to develop the teachers' knowledge and responsibility for the physical welfare of pupils,

each teacher should be intrusted with the preliminary observation and inspection of all pupils on their first appearance at school each day, and they should refer to the medical inspector, when he calls, each case which appears to require medical inspection. It is hardly necessary to say that this requires a certain measure of very desirable training and preparation on the part of the teacher, the possession of which should be determined as carefully as the other qualifications. The scheme of medical inspection should also include a systematic examination of each pupil by the medical examiner at stated periods not less frequent than once a year, and preferably two or three times each year. The results of these examinations should be communicated to the parents or guardians with recommendations as to needed treatment, if any, and this should also be done in the case of the daily inspections whenever treatment or more exhaustive examinations by the family physician or specialist is thought necessary.

It will be observed that the second and fourth of the above suggested agencies, and doubtless also the first and third, place added duties and responsibilities upon the local health officer. It is fully appreciated that the present duties of this officer, certainly in the more populous municipalities, are onerous in consideration of the meager compensation generally paid him; but it is also plainly evident that the new services proposed, which naturally and properly belong to this office, are of the highest importance and offer promising returns in the enhancement and conservation of public health, and that the natural and proper solution of whatever difficulty may be experienced in making these services of the health officer available is to require more of the health officer's time and to adequately compensate him therefor. It is almost inevitable that such increase of time and pay of this important public official, not only for this proposed service but others, must follow if public sanitation is to keep pace with sanitary knowledge. The result of this constantly increasing demand on the health officer is sure to be reached in the not-distant future in the absorption of his entire time and services, requiring that he abandon altogether the practice of medicine, and if competent men are to be retained the paying of adequate salaries commensurate with the income of the practicing physician. One incidental result of great importance will also doubtless be that if the health officer is to give his entire time and energies to his official work it will permit if not necessitate a specialization and preparation for his work which will greatly enhance his efficiency, and that these features will lead to greater permanence in office, which also will tend toward greater efficiency of service.

Passing to the second division of the topic, viz., sanitary instruction, it is evident that the school offers not only the earliest but also the best opportunity to disseminate, through the children to the general public, a fundamental conception of the rudiments of public health, sanitation and hygiene, and an understanding of the nature, means of transmission, and methods of prevention of the various communicable diseases. On the ground of public safety alone this general knowledge on the part of the public is an essential. Departments and boards of health, sanitary laws and measures will be of but little value unless the general public for whose benefit they are established are informed both as to the fundamental principles of their action and also as to their importance. This necessity is recognized by the New York State law providing for compulsory instruction in the public schools during six weeks of each year in physiology, and fortunately this study forms an important adjunct if not a necessary basis of the proposed sanitary instruction. The nature of the instruction and the means for giving it, while important, are not inflexible and may be adapted to suit the existing conditions. It may even be informal and claim no material amount of time from other school subjects, and need form no tax on the mental burden of pupils if the instruction is properly arranged and presented. Oral instruction carefully prepared and systematically presented by teachers properly trained in both the principles and the pedagogics of the subject, and appropriately illustrated by every-day, familiar examples and applications, may easily be made more effective and less burdensome to the pupils than formal text-book work and recitations. The executive school sanitation outlined in the first division of this paper, if properly explained in principle and application by the teacher, would in itself form admirable and available illustrative material.

This instruction, particularly if given informally and without text-books, presupposes a fairly thorough understanding of the subject and therefore preparatory training by the teacher. Is it too much to ask that the normal schools of the State shall extend even the good work that is done in these topics in certain schools so as to equip all teachers with even a more extensive and available form of knowledge of the principles and the procedure of sanitation and hygiene and also in the science of teaching it?

One State at least, Michigan, has for several years had on its statute books a law making the teaching of the rudiments of sanitation and the means of transmission and prevention of communicable diseases compulsory in all the public schools of the State. The same law requires the State board of health to furnish annually to the public school superintendents and teachers throughout the State printed matter which shall form the basis of such instruction. Our own State Commissioner of Health, Dr. Lewis, assures me that he will gladly cooperate with the Department of Education, if so desired, by furnishing, in the form of bulletins or otherwise, similar material for instruction purposes in New York State.

These suggestions are thrown out for consideration, not only by the health officers of the State here assembled, but also by the Department of Public Instruction, which, I am glad to see, is represented here to-day by Hon. D. E. Ainsworth, Deputy Superintendent of Public Instruction, the cooperation of which department toward any effort along the lines suggested would of course be essential to success and appropriate to the topic.

The Michigan law above referred to is hereto appended for your examination.

MICHIGAN STATE LAW, PROVIDING FOR THE GIVING OF ELEMENTARY SANITARY INSTRUCTION IN PUBLIC SCHOOLS

Michigan Public Acts, 1895, Chapter 146. Approved May 16, 1895.

An Act to provide for teaching in the public schools the modes by which the dangerous communicable diseases are spread, and the best methods for the restriction and prevention of such diseases.

Section 1. *The People of the State of Michigan Enact*, That there shall be taught in every year in every public school in Michigan the principal modes by which each of the dangerous communicable diseases are spread, and the best methods for the restriction and prevention of each of such diseases. The state board of health shall annually send to the public school superintendents and teachers throughout the state printed data and statements which shall enable them to comply with this act. School boards are hereby required to direct such superintendents and teachers to give oral and blackboard instruction, using the data and statements supplied by the state board of health.

§ 2. Neglect or refusal on the part of any superintendent or teacher to comply with the provisions of this law shall be considered a sufficient cause for dismissal from the school by the school board. Any school board willfully neglecting or refusing to comply with any of the provisions of this act shall be subject to fine the same as for neglect of any other duty pertaining to their office. This act shall apply to all schools in the state, including schools in cities or villages, whether incorporated under special charter or under the general laws.

Chairman Johnson—Hon. D. E. Ainsworth, Deputy Superintendent of Public Instruction, is expected to discuss this paper.

Mr. Ainsworth:

Mr. Chairman—I do not consider myself in anyway an expert upon this question, but I was very glad the topic was placed upon your program for discussion, because the Department of Public Instruction for the past year has had its attention called most forcefully to this question of school ventilation, at least, which is one feature of the paper which has just been read.

Under the law, as it now is, localities are required to provide adequate school facilities for the children residing in their localities. The constitution of the State, which is the organic law of course, provides the State shall maintain a free system of common schools wherein all of the children should be educated. Now this is done by dividing the State into cities, villages and school districts.

The author of the paper is correct when he says that probably quite one-half of the children of the State are outside of the cities; that is, they are probably outside of the cities and larger villages, like Saratoga and Glens Falls. Now these localities are charged with the duty of providing the facilities in which schools can be maintained. We all know the difficulty that most localities experience in obtaining an adequate appropriation for a decent school building. When you get outside the village in the country district, you find this difficulty still greater than exists in the village school district. The school district trustees in this State still seem loath to provide for the decent care of the scholars. As long as they have a district school that is all they care about.

Now last winter the Superintendent asked for some legislation providing for an inspector whose duty it should be to approve of the plans for every school that was to be constructed in this State. I care not whether that is in the Department of Public Instruction, or whether it is under the supervision of the State Board of Health, I would agree as an administrative officer that would be quite as well if it were under the direction of the State Board of Health, but that is the first legislation this State wants; that no school building can be erected or a legal tax levied for its construction until its plans as to foundation, light and heat have been submitted to a sanitary expert and approved by him.

Now when you have accomplished that you have gone a great ways. The law of to-day provides that no school building costing more than five hundred dollars shall be constructed unless the plans for its light and ventilation have been approved by the school commissioner. Now we have a good many good school commissioners in the State, but many of them are not experts on this question, and the first thing we want is to have these plans approved by a competent sanitary authority. I think it is safe to say that we will accomplish more by getting that legislation than we will by legislation along the lines of instruction in the schoolroom.

We have now an inspector appointed, entering upon his duties upon the first day of October, who will devote his attention entirely to the construction of school buildings. He will visit the localities where they are to be constructed and use moral persuasion to get them to provide adequate ventilation, light and sanitary equipment for the building. That is morally, but, as I say, we ought to be able to go on a building there—there ought, as I say, to be a law that no school building can be hereafter constructed unless its plans as to sanitary conditions have been approved by a competent sanitary authority.

Now coming to the second part of the Doctor's paper, I want to say I have been thoroughly interested in his paper; it is a good live question which we are discussing and I am glad you have got it upon your program—coming to his second thought, that we ought to have in the curriculum of our schools sanitary engineering taught, I should very much doubt the wisdom of that legislation. We are struggling in the State of New York I think to-day pretty hard to keep the curriculum in the schools down where it ought to be in necessary subjects, so that the health of the child is not undermined by overwork. The average life of the school child while in attendance upon schools in this State is less than one year to-day, and I should feel that it was not wise to devote a portion of that year to the subject of sanitary engineering. I would not want a compulsory topic added to the curriculum to-day. I think we have got enough to do to-day under the compulsory education law, bringing as it does all classes and conditions of children into the public school system, and when you remember that out of one hundred of our school children, four will go to college, six more will go to the high school, and that the other ninety never go beyond the grades devoted to the essential work in the rudiments of a good plain, ordinary, common sense education; if the boy is to be given that, that will require all his time.

Now so far as the suggestion that the State Board of Health would give us a circular to distribute, if it could be used voluntarily by the teachers, the Department of Public Instruction would receive the suggestion most heartily and would see that they were placed in the hands of our teaching force; but when it comes to a compulsory topic to be added, I am afraid I should differ with the distinguished professor, who knows more than I do, in the article which he has read in your hearing.

I do not know I can give any further light upon this topic, but I think some of you can, and I give you the floor. [Great applause.]

Chairman Johnson—Gentlemen, this question is open for discussion. We should be delighted to hear from any gentleman who desires to express himself upon this important subject.

Professor Landreth—I feel I have failed entirely in making my purpose clear if I have led Superintendent Ainsworth into the supposition that I was advocating an enforced system of instruction in sanitary engineering. Appreciating fully his objection, I had nothing of that sort in mind. I thought I made myself clear upon that point. I suggested that instruction should be given, but whether formally or informally is a matter of detail to be determined by the proper officials. The instruction I have in mind is simply the inculcation in the minds of the pupils of the fundamental principles of hygiene and sanitation and the means by which the communicable diseases are transmitted and the methods of their prevention. If that would interest any of our school children so they would go into this subject of advanced sanitation and hygiene, or sanitary engineering, you can see that would be another though a desirable outcome.

Dr. Howe—I rise to heartily second Mr. Ainsworth's remarks relating to the addition of one extra subject to the curriculum of our institutions. As a trustee of an institution, or rather of our high school at home, as the father of several children, as one watching the course of school children in our community, I am yearly impressed with the fact that our school children are doing too much. We need have no fear to-day of the school child in the State of New York being ashamed of its education, if that child will only be sent to school. They have all of the studies essential to a successful education for any child. The State of New York can proudly stand as a worthy example to any State, either in the United States or in the world, for her success, and I am glad to hear personally from the Superintendent's mouth that he will oppose the addition of any subject to the curriculum of our high schools. It has seemed to me that as physicians we are neglectful of one duty which we ought to be employed on as physicians, and that is to aid in a restriction of the work which is being done by our school children. Especially that is true at a certain age of our young girls. That is especially true of our intermediate departments, where these young girls are stepping into the academic department, when they are just such an age that they are susceptible, very susceptible to nervous influences; it doesn't take but a little to strain them, to break down the nervous system. There has been too much of an inclination just at that time to push the child into the academic department, to add one study to the curriculum. I say as a physician, and as one who has been in touch with a board of education, that we ought to hold back these children instead of pushing them forward, and I want to heartily second the idea of Mr. Ainsworth that our curriculum is high enough.

Dr. Heyen (of Northport)—I simply want to say that it seems to me we all should agree with the gentleman who has just spoken in the idea that we have enough studies, but it would be interesting to know from all the gentlemen present, it seems to me, whether in their experience in school work, I suppose most of us have had more or less experience, there is enough attention given to the study of hygiene. That ought to be rather obligatory. In my experience that is not so. The teachers in the public schools seem to be careless in that one study, and I believe that if the instruction in hygiene is carried out as outlined by the Superintendent that that is sufficient. It seems to me that would cover a great deal of the ground that Prof. Landreth has spoken of in his paper. I find this has happened so much in our place that one of the gentlemen has offered prizes for competition in the matter of studies in hygiene. I should like to know—as I said, it would be of interest to know—if that obtains in most of the schools, or in some of them at least, outside of our place. I might add that very few of them seem to pass an examination, a satisfactory examination—I have had something to do with that—in ordinary hygienic rules.

Dr. Goff (of Corning)—It seems to me as a health officer that this adding to our duties part of the work of a board of education is piling it up pretty thick. We have had our duties added to by the Labor Bureau, and now you come with the Board of Education, with another proposition. The health officer in a small town, one of twelve or fourteen thousand, involves important duties and rather numerous. I don't think you allow him time to take care of his ordinary practice, not if you add to his duties as health officer work which should be done by the Labor Bureau of the State and the boards of education. The Labor Bureau of New York more particularly sent out a very long list of instructions and advice and suggestions. They piled it on to our duties. Perhaps a great many people, especially those outside of the country towns, may not understand what this work is. In my town I have already distributed in 150 places copies of the law which must be posted. They have added to our work in a way which I think was unquestionably hard. I would like to know also, now that I am talking about this, if the Department of Health wants us to distribute that through mercantile and other business establishments? If so, you will have to provide us with stenographers, etc., or we can't do our duty as the law says. On top of this now every sewer, every particle of water and filth and everything which comes from any manufacturing establishment, smaller sewers which are not directly connected with the main sewer, all come under the supervision and examination of the board of health, and it follows that the board of health will leave the work to the health officer to do.

And now comes this educational proposition to examine the schoolhouses. If you pass that law arbitrarily, we will be up against the school board. We will be up against the sewer commission in examining sewers. We are up against the Labor Bureau in certain respects. I think this suggestion of Mr. Landreth's could be disposed of if you had an inspector to look after the sanitation of these schoolhouses.

Chairman Johnson—Is there any other gentleman who desires to discuss this question? It is a very important one and a meritorious one. There is hardly a physician here who lives in any district in this State but what has had experience of a similar character, especially during the examination of school children. and particularly in the academic or college department, where they are pressed, where teachers urge them in their advancement. We know how many of them break down; you have them as patients. Many of them, as a result of physical disability, are unable to continue. That is what we are confronted with. I think that our curriculum is pretty fairly advanced. They have about all they can stand; many of them more than they can stand. We not only see it in these departments, but we see it in our universities. Many of our merchants and bankers suffer from the same thing, only in different character. How many cases of paresis are we meeting? How much of that character of nervous disease is brought upon them by strain of overwork, mentally especially. I have thought a great deal upon this subject. I think it is one of great interest, and one that needs our careful attention, especially on the part of boards of education, principals of schools and teachers.

Is there any other gentleman who will discuss this question or who desires to say anything more in regard to it? If not we will pass on with the program.

Dr. Lewis—The fourth paper on the program is "Care of the Eyes of School Children," by Professor Callan.

Dr. Callan has not reported as yet, and owing to the lateness of the hour, we will presently adjourn until the evening session.

A message from Dr. Doty informs me that he can not be present to-morrow, as he is scheduled; but he wishes to attend the conference, especially to hear Dr. Fulton's paper this evening, and is on his way here now, I presume. I promised to place Dr. Fulton's paper on the program second to-night, instead of first, as it is printed on the program, without the Doctor's knowledge or consent, and without Dr. Pease's consent, also. I think, under the circumstances, we are justified in making the change, in order to hear Dr. Doty, possibly, discuss Dr. Fulton's paper.

There has not been, to my knowledge, any large number of papers passed up here for answer; but if any gentlemen have questions—not only questions relating to the papers that have been read, but relating to your work of any kind that you wish to have answered—if you will pass them up to the desk at any time (prepare them as briefly as possible) we will, after the first paper this evening, take a little time to answer what may then be on hand, if we are able to answer them, and an hour to-morrow morning, perhaps at the end of the typhoid fever discussion of Dr. Soper's paper, we will do the same thing.

We would like the greatest freedom of course on your part in sending in these questions. Any question which is received which is not covered by the program we may be able to find somebody here who can answer it.

We will now adjourn until 8.15 this evening.

EVENING SESSION.

THURSDAY, *October* 8, 1903

Dr. Lewis—The first order of the meeting to-night is a paper by Dr. Pease, the director of the Antitoxin Laboratory, on the use of Tetanus Antitoxin.

THE SERUM TREATMENT OF TETANUS.

BY HERBERT D. PEASE, M. D., DIRECTOR OF ANTITOXIN IN LABORATORY, STATE DEPARTMENT OF HEALTH, ALBANY, N. Y.

MR. CHAIRMAN AND GENTLEMEN—In the paper presented to the conference of last year I considered in a way the subject of the use of tetanus antitoxin in the treatment and prevention of tetanus. I am not now, therefore, going to deal with the subject as a whole, but will make a few remarks upon the additions made to our knowledge during the past year, and briefly recite the histories of some of the cases in which our antitoxin has been used, and will lay special emphasis on the methods of administration of the remedy.

It will be remembered by those of you present last year that I stated that the specific symptoms of tetanus were due to the passage of the poison, or poisons, produced by the tetanus bacillus from the site of the injury and infection to the nerve elements which became affected. You will also recollect that it was stated that the nature and proportionate composition of the elements of the so-called toxin were relatively unknown factors, and that the path of the toxin and the ultimate nerve elements chiefly affected by the toxin were still matters of dispute.

Concerning the nature of the toxin no work of special value has appeared since that time, but concerning the path of this toxin from the site of its production to the central nervous system much has appeared, and many of the obscure points concerning the period of incubation, the progress of the disease, and more especially the mode of operation of antitoxin both as a preventative and as a curative agent are now capable of intelligent explanation.

Time will not permit me to go into the interesting details of the work of Meyer and Ransom, of Morax and Marie, and of Behring, but it will be sufficient to state in a general way their conclusions.

From the work of these investigators it is shown that the toxin produced in the injuried tissues by the tetanus bacillus passes to the central nervous system only through the medium of the axis cylinders of those nerves which are in effect prolongations of the neurous or ganglionic cells of the pons medulla and spinal cord. The toxin is not, however, carried by those nerves, such as the optic, which are in fact prolongations of cerebral tissues. The specific poison is first absorbed through the ultimate distal terminations of these nerves, and passes toward the central nervous system only through their axis cylinders and not along the nerve lymphatics.

Not only does this passage occur through the nerves terminating in the neighborhood of the area infected, but that portion of the toxin which is absorbed into the blood and lymph channels of the body finds its way into the nerves of all parts of the body through their ultimate terminations. The power of absorption of the poison varies with the different nerves. Thus Marie and Morax found that the motor branch of the trifacial nerve, supplying the muscles of mastication, in a horse, contained a larger proportion of the tetanus toxin injected into one of its hind legs than any other nerve of the body, except the sciatic nerve of the leg injected.

Not only have the motor nerves this special affinity for the toxin, but the vasomotor and sensory nerves are also capable of absorbing the poison through their nerve endings.

The rate of transmission of the toxin through these nerves varies, not only with different nerves but in different species of animals. It is supposed that the length of a nerve is a factor in the rate of transmission, inasmuch as in a general way the smaller the animal, and therefore the shorter nerves, the shorter the period of incubation. (Courmont et Doyan.) There is no question that the concentration of the toxin at the point of its absorption by the nerve endings plays an exceedingly important part in the rate of absorption and transmission of the poison through the nerves to the central nervous system.

The course of the specific poison in the body can be stated briefly as follows: Given a tetanus infected wound, the absorption of the toxin occurs in two directions simultaneously, into the blood and into the local nerve endings. From the blood the nerve endings of the motor branch of the trifacial nerve absorb the poison quickly, and all the other nerves of the body soon follow the same course. Thus the toxin is rapidly and securely started in its centripetal course towards the central nervous system through the axis cylinders. That portion of it passing through the nerves leading from the site of the toxin production will, upon reaching the cells in the spinal cord of which their fibers are the branches. cause their specific irritation and a tetanic contraction of the muscles supplied by the nerve results. This is the so-called local tetanus which is sometimes seen in chronic cases of the disease. but very infrequently in the acute cases. This nonappearance of local tetanus in acute cases is explainable on the basis that the rate of absorption of toxin from the blood and lymphatics by other nerves of the body, more especially those supplying the muscles of mastication and the neck, and the rate of transmission through them to their nerve roots is greater than the rates of absorption and transmission of the poison supplying the local area infected. In this way the early irritation of the cells in the nerve roots of the nerves supplying the muscles of the jaw and neck cause the precocious appearance of trismus in such cases.

This mode of passage by the toxin has an exceedingly important bearing on the antitoxin treatment of the disease. The toxin already present in the axis cylinders of the nerves can not be reached and neutralized by antitoxin present in the blood. To a large extent this is also the case with the toxin which has passed through the nerves to the nerve roots in the spinal cord.

These facts explain the observation of Donitz on rabbits that in a series of animals, each injected with twelve fatal doses of the poison, the amount of antitoxin necessary to save the life of one of them, if the same was mixed and injected simultaneously with the toxin, would have to be increased six hundred times in order to save another animal of the series if the serum was not administered until two and one-half hours after the injection of the poison.

It is easy, therefore, to understand that in the prophylactic use of the tetanus antitoxin the toxin being produced is easily neutralized by the small amount of antitoxin in the blood before the nerve endings have an opportunity to absorb any of it. However, in the case of injections of antitoxin for curative purposes after the poison has been taken up by the nerves and reached the spinal cord, the only results consist in neutralizing the poison in the blood and that not yet absorbed by the nerves. Thus if in a given case sufficient time after injection has elapsed so that enough toxin has been taken up by the nerves to constitute a fatal dose for the patient, nothing short of the heroic use of antitoxin, if given by subcutaneous or intravenous injections, can be expected to produce the slightest beneficial results.

From what has been said the conclusion is clearly evident that the theoretically ideal method for the administration of tetanus antitoxin for therapeutic purposes would be the injection of the serum into those nerves chiefly affected. This has been done in but one case in a man suffering from an acute attack of the so-called local tetanus. The results were reported as most excellent. It hardly needs to be stated, however, that such a method of administration is clearly out of the question in most instances, for it would be impossible to inject the remedy into the nerves supplying the muscles of the jaws, neck and back, to say nothing of the sympathetic system, and these are the ones most generally and most seriously affected, especially in the acute cases.

Meyer recommends the intracerebral method of injection of Roux and Rorrel, but it is evident that the injection of a few cubic centimeters of the antitoxin into cerebral tissues will not tend to neutralize the poison acting in all the lower portions of the nervous system from the floor of the fourth ventricle downward. It can be objected, as Myer does, that the subdural injection of tetanus antitoxin does not bring it into direct contact with the affected cells in the roots of the spinal cord and cranial nerves. It seems to me more logical to suppose that the direct bathing of the entire cord and brain with a large amount of antitoxin would be more likely to insure an indirect action on these elements by its penetration through the lymphatics of the cord than would the injection of a few cubic centimeters into the cerebrum be likely to affect even the nerve roots in the floor of the fourth ventricle, and much less so the nerve roots in the spinal cord.

I think the cases which I shall report upon to-day will indicate that the subdural injection of antitoxin is certainly as productive of good results as any method now available in the attempt to neutralize the toxin when it has already reached the nerve roots in the central nervous system.

For the neutralization of the toxin still present in the tissues and blood the intravenous or subcutaneous methods are entirely efficient, but large amounts are advisable in order to reinforce the antitoxin injected by the lumbar puncture method.

Thus it will be seen that the use of at least two methods of injection are to be strongly advised: The subcutaneous or intravenous for the purpose of neutralizing the toxin present in the blood and lymphatics, and secondly, the subdural method, directing the antitoxin toward the toxin already passed through the axis cylinders of the spinal and some of the cranial nerves to their roots. The amount of antitoxin used for the subcutaneous or intravenous injections should not be less than fifty (50) cubic centimeters, and should be repeated every eight to twelve hours for an indefinite period, but certainly until full recovery is in sight. For the lumbar puncture the experiences of this last summer indicate that fifty (50) cubic centimeters can be given a child without any demonstrable inconvenience to the patient, and be repeated every twelve hours for several days.

The technique of the lumbar puncture is as follows: After the proper surgical preparation of the skin over the region of the lumbar vertebrae, a point between the third and fourth lumbar vertebrae is taken, and about half an inch on either side of this point the sterilized needle of a syringe, at least two inches long, should be inserted under the local cocaine anaesthesia and directed towards the median line of the spinal column. After a little probing the needle will enter the intervetrebral foramen and pass into the spinal canal and penetrate the dura. It is well to allow any cerebro-spinal fluid which will do so to flow out through the needle. The sterilized syringe, into which the antitoxin, heated to the body temperature, has previously been drawn, can now be attached to needle and the serum slowly injected. If the syringe does not hold the full amount to be injected it can be detached from the needle and again refilled, and the operation repeated. In but one of the cases to be reported in which fifty (50) cubic centimeter doses have been used did the passage of the serum into the subdural space cause even a slight increase in the tetanic symptoms, and even then the pain caused in the lower limbs was very temporary.

In all I have been able to collect the more or less complete histories of sixteen cases. Of these seven were acute cases; that is, those having a period of incubation of ten days or less and with an early and rapid onset of the severe symptoms. Of the subacute cases, or those having a period of incubation of less than ten days or with a very slow onset of serious symptoms, or their absence altogether, there were five cases.

Of the acute cases, all of which died, only two received injections of enough tetanus antitoxin to warrant any expectations of its having a favorable influence upon the course of the disease. I will go into the details of the histories of these two cases, as they illustrate several important points in the treatment of the disease. I am indebted to Dr. A. W. Elting, of Albany, the surgeon who attended both cases, for their histories.

Case 2. Man of 57 received on May 11th a punctured wound of the foot from a wire nail, which received no professional attention. A little less than ten days later, on May 21st, he had several pains in the muscles of the back and neck, soon followed by stiffness of the muscles of the jaws. This progressed until, twenty-four hours later, the stiffness of these muscles had increased and there were occasional spasms in them. Thirty-six hours after the onset the symptoms had increased and the case was first seen by Dr. Elting, and 50 c. c. of tetanus antitoxin was at once administered, which six hours later was followed by another injection, both subcutaneously. Notwithstanding these injections the symptoms progressed and the muscles of the back became extensively involved. At noon, May 23d, or two days and three hours after the onset of the disease, lumbar puncture was performed and twenty c. c. of antitoxin was injected subdurally. Within one hour the spasms had become decidedly less frequent, less severe and less extensive; there was much less rigidity of the muscles and the patient was again able to swallow liquids. During that afternoon and night the patient was very comfortable and slept for one and two hours at a time. Three doses of 100 c. c. of antitoxin were given subcutaneously during that period.

At nine o'clock the following morning, May 24th, the symptoms became aggravated again and progressed rapidly notwithstanding another subcutaneous injection of 100 c. c. of antitoxin. By noon the patient was in a critical condition, general spasms were occurring every two minutes and the opisthotonos was marked. Lumbar puncture was again performed and 50 c. c. of antitoxin was injected into the subdural space. This is a larger amount than had ever been injected subdurally up to that time that we have been able to learn of. Forty-five minutes later the patient's condition was decidedly improved and continued to improve during the early afternoon and 100 c. c. of antitoxin was injected subcutaneously. Later in the early evening the symptoms again became decidedly worse, and the lumbar puncture was again performed and 50 c. c. of antitoxin injected and again the critical condition was relieved. At midnight, while the patient was apparently comfortable, he died suddenly after having been fed by the nurse.

A complete autopsy was performed that same morning. The important findings were an extensively atheromatous condition of the arteries, including the cononaries, and no lesions of the spinal cord other than a slight congestion in the cervical portion. We were thus able to satisfy ourselves that the large subdural injections had not perceptibly injured the spinal cord.

The tissues about the site of the injury were examined bacteriologically, but the examination not only did not show the presence of the tetanus bacillus, but the insertion of the tissue under the skin of two guinea pigs failed to produce any symptoms of tetanus in them.

These results show that the toxin at first present in the wound had either been entirely absorbed by the nerves or had been neutralized by the antitoxin in the blood. Very possibly the first hypothesis is the correct one.

The improvement resulting after the subdural injections was in marked contrast to the apparently negative results obtained by the injections of twice the amounts of antitoxin subcutaneously. While the case was one of great severity there was well founded hope of recovery up to the time of his death, and the latter was probably brought about through the atheromatous condition of the coronary.

Case 4. The second acute case to be treated with proper doses of antitoxin was in the person of a young delicate girl. The injury was the same as in the previous case. The incubation period was only seven days, but the disease did not progress with great rapidity during the first forty-eight hours. Local tetanic contractions of the leg and foot injured were present early. Twenty c. c. of Parke, Davis & Co.'s antitoxin were injected twenty-four hours after the onset of the symptoms. Twenty-four hours later 50 c. c. of the State antitoxin were injected subcutaneously, and at the same time the site of the injury was exercised while the patient was under ether.

The symptoms progressed rapidly during the afternoon and 50 c. c. of antitoxin were given subcutaneously, but with no effect, and a few hours later 50 c. c. was injected intradurally and resulted in some improvement in the symptoms. Although another subcutaneous injection was given, the spasms became more severe and frequent in a few hours, and at 1.40 a. m. another intradural injection was given, but without any benefit. The spasms became more frequent, and although two more injections subcutaneously were administered the patient became much worse and died at 8.05 a. m., or about sixty hours after the onset of the symptoms.

This can be safely classed as an acute case, and on account of the general debility of the patient was doomed from the beginning. The good effect of the subdural injections on the frequency and severity of the general spasms, while not so marked as in the previous case, was still evident. The occurrence of local spasms in a case running such an acute course is unusual. The bacteriological examination and guinea-pig test of the excised tissues failed to show the presence of either the tetanus bacillus of its toxin in them.

The other five acute cases may be summarized briefly as follows:

Case 11, with a compound fracture of the humerus on July 20th, had symptoms of tetanus developed on the sixth day, and was dead on the seventh. During that very short time 90 c. c. of the State antitoxin was injected in divided doses of 10 c. c. each, but naturally without effect.

Case 12, in a woman with a slight July 4th injury to one finger. had an incubation period of eight days. The symptoms progressed rapidly, and the patient died on the second day of the disease. During that time she had received 170 c. c. of State antitoxin subcutaneously, and the attending physician reports that the spasms were controlled by it.

Through a very unfortunate misunderstanding as much antitoxin as should have been used in this case was not available at the time it was needed.

Case 13, in the person of a boy with a slight July 4th wound in the palm of the hand, had an incubation period of five days, and died during the sixth day. He received 20 c. c. of the Department's antitoxin subcutaneously.

Case 14, in the person of a woman with a compound Potts fracture, had an incubation period of nine days, and died between the eleventh and twelfth days. She received only 20 c. c. of the Department's antitoxin on the tenth day.

Case 15 occurred in a twelve-year-old boy with a lacerated toe. due to a bicycle accident. He had an incubation period of eight days. The onset of the serious symptoms was most rapid; convulsions developing within four hours from the first onset, he received 50 c. c. of the Department's antitoxin subcutaneously, but died three hours later.

All of these five cases were clearly hopeless, and it is doubtful if subcutaneous injections of any amounts of antitoxin would have been of much avail.

I have grouped the next four cases under the heading of subacute attacks. All recovered under heroic treatment with antitoxin. As these cases are of the class which have neither the hopelessness of acute types of the disease just described nor the favorable prognosis which the genuinely chronic cases usually warrant. I shall speak of them in greater detail, for without doubt antitoxin finds its therapeutic value in just this group.

Case 1 occurred on a woman on whom abortion was produced early in pregnancy. Nine days later, on May 17, 1903, she had beginning stiffness of the jaws, which gradually became more and more severe, but still localized, until four days later the muscles of the back of the neck became affected. On the second day of the attack 10 c. c. of Parke, Davis & Co.'s antitoxin were injected and repeated every six hours for eight doses, but with no lateration of the symptoms.

On May 21st, the fifth day of the attack, she was brought to the Albany hospital and placed under the care of Dr. A. W. Elting. The disease was then confined to the head and neck. At noon 100 units of Behring's dried antitoxin were injected subcutaneously, but with very little if any improvement. She became worse during the afternoon, and 50 c. c. of the State Department's antitoxin was then given subcutaneously, but with no effect, as the symptoms became gradually more severe, extending during the night to other parts of the body. The next morning, May 23d, while getting worse, 100 c. c. of the Department's antitoxin were given subcutaneously with apparently some beneficial result, but this was soon followed by much more severe spasms and a critical condition soon prevailed. In the latter part of the afternoon lumbar puncture was performed and 50 c. c. of the State Department of Health's antitoxin was injected subdurally. The symptoms began to improve in about three hours, and the patient rested fairly comfortably and slept at intervals during the early part of the night, one subcutaneous injection of 100 c. c. being given. In the early morning the symptoms again became more severe, and at 8 a. m., May 24th, 100 c. c. of antitoxin were given subcutaneously with but little benefit.

By noon the case again became critical with general spasms about every five minutes. Another subdural injection of 50 c. c. was given, after which the patient slept for an hour and had no spasms for a period of 2½ hours. Late in the afternoon slight spasms again occurred and increased in severity, until at 9 p. m. another 50 c. c. injection was given subdurally, followed by decided improvement, although not as great as after the previous spinal injection. During that night she received 100 c. c. subcutaneously and passed a fairly comfortable period until the next afternoon, May 26th, when another subcutaneous injection was given with good results. Antitoxin in 100 c. c. doses was given in this way on May 27th and May 28th, after which the improvement was so marked that none was given except on June 3d and 6th, with the hope of relieving the rigidity of the jaws. She was discharged from the hospital June 23d.

This case is noteworthy in that it was a case of puerperal tetanus of a subacute type. This case was the first in Albany to receive so large a subdural injection of antitoxin as 50 c. c. So far as we can ascertain no amounts anything approximating the size of this dose have been given elsewhere by this method. In all the patient received 1160 c. c. of antitoxin subcutaneously and 150 subdurally, the latter entirely within a period of 27 hours and with no temporary or permanent inconvenience or any damage to the central nervous system.

Time will not permit me at this time to give with any degree of fullness the histories of the other three subacute cases.

Case 4. The second of the series occurred in an Italian under the care of Dr. C. Howard Travell, of Troy. The duration of the period of incubation was about a week. The symptoms developed steadily until on the fifth day they were very severe in character. No antitoxin was given until the fifth day, and then 100 c. c. was injected subcutaneously in two doses with some relief, lasting several hours. The spasms then increased very decidedly in severity and 50 c. c. of antitoxin was injected subdurally, followed by very marked relief for several hours. The spasms becoming more severe again, a subcutaneous injection of 50 c. c. was given. During the following forty-eight hours the symptoms alternately increased and decreased twice, the amelioration on both occasions being due to injections of antitoxin, one of which was given subdurally and the other subcutaneously. The patient eventually recovered, having received 270 c. c. subcutaneously and 80 c. c. intradurally. While not an acute case the ultimate severity of the symptoms warrants, I believe, its inclusion in this group of subacute cases. The relief following the subdural injections, Dr. Travell says, was very remarkable.

The third case in this series occurred in a young man, a patient of Dr. C. E. Campbell, of Niagara Falls, who sustained an injury of the hand on July 4th. The period of incubation was eleven days. Ten c. c. of antitoxin were given subcutaneously within twenty-four hours of the onset, and larger doses were given daily thereafter until 1640 c. c. had been used. The symptoms developed until convulsions and opisthotonos were present. A marked contraction of the injured arm developed about a week after the beginning of the attack. The patient eventually fully recovered.

This was a very severe case when I saw it with Dr. Campbell on July 25th, which was the tenth day of the disease. The general condition of the patient remained good throughout the attack, notwithstanding the severity of the symptoms.

The fourth case of this subacute group was in a woman, a patient of Dr. J. V. Hennessy, of Albany. The injury was from stepping upon an old nail. The period of incubation was ten days, but the course of the disease once started was not rapid, although finally the condition became very severe. Patient was taken to St. Peter's Hospital, Albany, on the third day of the attack, where she was seen by Dr. Hennessy for the first time. Fifty c. c. of the Department's antitoxin were given subcutaneously immediately, but with little effect, and was followed in a few hours by 50 c. c. given subdurally. The general spasms diminished in severity and frequency in a very short time. During the next twenty-four hours 100 c. c. of antitoxin were given subcutaneously, but the spasms again became very severe by the following day and 50 c. c. was given subdurally with excellent results. Beginning the next day, or the sixth day of the disease, 100 c. c. of antitoxin were injected subcutaneously for eighteen days, so that before complete recovery the patient had received in all 2000 c. c. subcutanously and 100 c. c. subdurally. This case had a marked degree of local tonic contraction of the infected foot beginning on the third day and lasting until long after all other symptoms had disappeared.

Of these four cases I think it may be safety questioned whether recovery would have taken place without the use of tetanus antitoxin. Those receiving the intraspinal injections were invariably much relieved for a varying length of time, depending on the severity of the disease. On the other hand, the subcutaneous injections, except those following a subdural injection, generally failed to give any immediate relief, and their usefulness was probably, to a large extent, confined to the neutralization of the toxin in the blood and tissues other than the nerves and spinal cord.

In the third group are those which should be considered as mild or chronic cases. Of these there are six, and one received no antitoxin.

The first, Case 5, of my series, occurred in the practice of Dr. R. H. Tedford, of Albany. A fourteen-year-old boy with a blank cartridge wound of the hand had an incubation period of only five days. However, the course of the disease was very slow, general spasms not developing for eight days. The State Department of Health's antitoxin was used in 50 c. c. doses subcutaneously twice daily from the tenth day to the twentieth, and then once daily until the thirtieth day, in all 1500 c. c. of the remedy being given. Dr. Tedford states that a gradual but decided improvement occurred after the injections of antitoxin were begun. No immediate beneficial effects of its use were noted.

The second of this group, Case 6 of my series, occurred in a young man injured by a buzz saw which had been sawing some old wood. He was treated at the Samaritan Hospital, Troy. The incubation period was ten days, and the first symptoms was a stiffness in the injured leg, which in three days spread to the abdominal muscles. The jaws were also affected at this time, and the back to a slight degree. On the fourth day of the disease he received 10 c. c. of the State Department of Health's antitoxin subcutaneously at 50 c. c. intravenously twice a day, and in all had 660 c. c. of antitoxin. He began to improve rapidly on the tenth day and eventually recovered. The very interesting feature of this case was that the local tetanus was the first symptom of the disease. I know of but one other case in the literature where the local tetanus was the first symptom observed.

Case three of this group, Case 7 of my series, occurred in a boy fourteen years old with laceration of the knee, in the practice of Dr. D. C. Moriarta, of Saratoga. The period of incubation was very long, being eighteen days. The onset of the serious symptoms did not occur until seven days later. There were general muscular spasms at intervals of five or ten minutes for about four days. One hundred c. c. of the Department's antitoxin were administered on the second day of the attack, and the same was repeated every twenty-four hours for eight days, when a decided improvement set in, and the patient recovered.

The fourth case of this group occurred in a woman of 53 suffering from severe burns of both legs and thighs. The history kindly sent to me by Dr. Sheldon Voorhees, of Auburn, states that the patient was an alcoholic and used morphine. The period of incubation was seventy days, and the onset of the serious symptoms was slow. Ten c. c. of antitoxin were given subcutaneously on the first day of the attack, 80 c. c. on the second, 200 on the third, 50 on the fourth, 200 on the fifth, 100 on the sixth, and on the seventh day she received 50 c. c. intraspinally. Notwithstanding the mild character of the attack, and the vigorous treatment with antitoxin, the patient died. The fatal termination was due, in Dr. Voorhees' opinion, to the weakening of the heart, for which very probably the alcoholism, morphinism and the burns were largely responsible.

The last case in the series occurred in a healthy laborer of good habits in the practice of Dr. Stanton Curry, of Peekskill. He was injured in the hand by explosion of a large fire cracker. The period of incubation was ten days. The course of the disease was mild, slight opisthotonos not developing until the fifth day. He was treated altogether with chloral and bromide in large doses, no antitoxin being administered. I saw him on the ninth day of the attack and he seemed to be doing so well, and it was so late in the course of the disease, that I considered it unnecessary to use antitoxin. However, in a few days his heart showed signs of weakening and he died on the sixth day, at which time there were no symptoms of tetanus.

This case does not properly belong in this series, as it was not treated with antitoxin, but it is included in order to show that even a mild attack of the disease can kill some patients.

I think the facts here given warrant the following summary and conclusions:

(1) That of the fifteen cases treated with antitoxin seven were of a decidedly acute type, all of which ended fatally.

(2) That there was no hope of saving five of the seven under any form of treatment, owing to rapidity and severity of the attack.

(3) That two of the seven, having reacted beneficially to the antitoxin treatment, might have recovered if certain conditions had permitted, namely, a general atheromatous condition of the arteries in Case 2, and a larger supply of antitoxin in Case 12.

(4) That of the series of fifteen, four cases which recovered were intermediate between the acute and chronic forms of the disease, but were nevertheless severe cases.

(5) That all of this group reacted favorably to the antitoxin treatment, and that this was especially the case in the three receiving subdural injections of 50 c. c. of antitoxin.

(6) That of the three typically chronic cases which recovered, it might be possibly true that recovery would have occurred without the antitoxin treatment, although on the other hand is the death of one mild case under the chloral bromide treatment without antitoxin.

(7) That one mild case treated with antitoxin died from a heart weakened by alcoholism and morphinism, combined with the after effects of very severe burns.

(8) That the so-called local tetanus—that is, tonic contractions of the muscles near the site of infection—is more common in human beings than has been supposed, as it was present in four of the series of fifteen. One of these four was an acute case, which is unusual, and in another the local tetanus was the first symptom of the disease, which is most unusual.

In closing I desire to again call your attention to the ideal use of tetanus antitoxin, and that is as a prophylactic agent. From the standpoint of our recent knowledge concerning the absorption and passage of the toxin by the nerves, during which time it is inaccessible to the antitoxin, it is easy to understand why so small an amount as an immunizing dose of 10 c. c. can neutralize all the poison produced before its absorption while hundreds of times that amount of antitoxin serum, given after its absorption, has but little effect. Practical results so far obtainable have fully confirmed the value of tetanus antitoxin as a prophylactic agent. I have reports from a few of the cases in which the State product has been used for that purpose and none of these twenty-eight cases developed the disease, although practically all of them had injuries of the class commonly followed by tetanus, and lived in localities where tetanus has occurred in the past.

Dr. Lewis—This paper of Dr. Pease is before you for discussion. Does anyone wish to talk upon the subject? Has anyone had any experience in handling these cases? Did any of you have any of these cases that Dr. Pease has reported?

While upon this subject, I would like to say that I was asked to say this afternoon, in response to a number of queries as to whether this Department had stopped the distribution of diptheria and tetanus antitoxin, that the matter stands just as it did when we began. We are still distributing it to health officers in the usual way.

This question has arisen, I suppose, from the fact that the city of New York no longer sells antitoxin to people outside of the city. New York city, under the Public Health Law, has a little domain of its own down there. Of course, it is unfortunate for New York city, but the fact remains that they have an independent health department.

Before having the questions answered which have been passed up here, I wish to congratulate you upon the fact that all of the gentlemen who have been expected to take part in this meeting are liable to be present.

A telegram from Dr. Lederle this afternoon states that he will be here tomorow night with his paper on the Milk Supply, and Doctor Fulton you have already been introduced to; and now, before proceeding further, I would like to introduce Dr. Evans, of Chicago, who has come from that city to give us his ideas on the subject of Tuberculosis. Dr. Evans, of Chicago.

Dr. Evans:

MR. COMMISSIONER, LADIES AND GENTLEMEN—I will not intrude upon your time and attention this evening, but will speak to you tomorrow upon the subject of Tuberculosis, and I will make my introductory at that time. I thank you very much.

Dr. Lewis—A few questions are here which relate to New York city and New York city administration, and some are of a more general character.

"Is it advisable to exclude children who are having chicken pox and whooping cough from the public schools?"

I will ask Dr. Fulton if he will answer that question.

Dr. Fulton:

MR. CHAIRMAN AND GENTLEMEN—There are practically two questions here. Chicken pox and whooping cough cannot be considered on exactly the same plane. Much would depend on the circumstances with respect to chicken pox. If the diagnosis of chicken pox is pretty firmly established, I doubt the propriety of excluding from the schools any others from that family than the person who is at the time sick. I do, of course, think that the child sick with chicken pox should be excluded from the public schools until it is quite cured. It is a disease of a very trifling character, however, and that exclusion is chiefly in the interest of the sick person. A certain amount of anaemia follows an attack of the disease, which the child should have time to recover from. Otherwise the work is not perhaps injurious to the child as to its vital organs, but might be to its eyes.

Then, my answer is that a child sick with the chicken pox should be excluded from the schools chiefly on its own account. I do not think you should exclude other children of the family, because chicken pox is not serious enough to justify it.

I think children with whooping cough ought to be excluded from the schools, but there are practical difficulties in doing so. I know no one who can make a diagnosis of whooping cough. There is but a single clear sign, which is an expiratory whoop which occurs at the end of a convulsive spell of coughing. That is very often absent in the case, as the case will run its whole course of five weeks without showing that symptom.

A child sick with whooping cough should not go to school, but practically, in the beginning of an outbreak they do go to school and no diagnosis is made. It is a very infectious disorder and it is injurious to very young children; less so to children of school-going age.

On all accounts, I think that, when recognized, cases of whooping cough should be excluded from the schools.

As to the exclusion of children who are in the house but not sick, I confess quite a doubt. It is very difficult to do. We don't know the specific organism of whooping cough, but I think there is no evidence that it can be carried by a third person. So that the most I would recommend as a practical measure in treating cases of whooping cough among school children would be to advise the teacher to return home a child coming from a family where whooping cough is present when that child begins to cough in school, not earlier. But I think it is rather doubtful that practical results will come of an attempt to control an outbreak of whooping cough—it goes its way.

Dr. Lewis—Here is another question: "In relation to who is properly entitled to the antitoxin (Diphtheria) made by the State of New York, please define the words 'unable to pay for it?' What is the status of hospitals where the board and treatment of the diphtheria patient is paid for?" I think Dr. Pease ought to answer that question.

Dr. Pease—Those same questions have been asked the Department on several occasions. My custom is to reply that the health officer or the physician are the only ones capable of judging whether a person is able to pay for it or not. The State Department is unable to decide that question for the health officer or physician.

The object that the State Department has is, as I take it, that every case of diphtheria shall receive proper treatment with antitoxin, and if the parents or the person themselves are able to pay for a small quantity, it would be well for them to buy that amount. If they need more and can not afford to buy it after that, why then they are proper subjects for the administration of the State antitoxin. I think that, if health officers and physicians keep that point in mind, that the child or person should have just as much as they need, and if they can afford to buy some, let them buy that, and if they can't afford to buy any, let them have the State antitoxin all through.

I think the same rules apply as to the second question. I think the doctor's bills ought to be paid first under any circumstances, and if the person can only afford to pay the doctor's bills, and can not afford to buy the antitoxin, I believe it is the object of the State Department to see that that person is properly supplied with this necessary drug; but if they can afford to pay board of any amount, more than the mere insignificant sum which is charged in some hospitals, then I should think they were able to pay for antitoxin, in which case it should be purchased from some commercial house.

Dr. Lewis—May I ask a question on the same subject, Dr. Pease? Would a health officer be justified in administering the State antitoxin to a diphtheria or tetanus patient who is abundantly able to pay for it, provided the antitoxin could not be promptly procured? For instance, if the patient lives in an isolated district, fifty miles from a city where he could buy it, would the health officer be justified in using State antitoxin?

Dr. Pease—I have been asked that question also in many letters. and I have usually replied that I did not believe that the public as a whole, or the Legislature, intended that any person should not have a remedy which was absolutely necessary for the safety of their life, simply on account of a technical ruling which was made to cover cases under ordinary circumstances and not extraordinary ones; on the other hand, I held that it was the expectation of the Department that the druggists and physicians who were treating. under ordinary circumstances, the well-to-do should make just as good preparations for the well-to-do as the State did for the poor.

Dr. Goler—I think, if I understand Dr. Pease, that the city of Rochester will have to ask you to establish a new antitoxin laboratory.

We, at the present time, have in the city of Rochester, or had last month, 167 cases of diphtheria reported. We have had an epidemic of diphtheria there, covering several hundred cases, and that epidemic has lasted for several months, and is still pursuing its way with unabated vigor.

I simply arise to ask this question: We have, for instance, a little street, perhaps a few hundred feet long, and that street is inhabited by the lowest order of Italians. I think that every fourth house in that street is placarded with a diphtheria sign, and there are one or more cases in every house on that street that is placarded with the sign diphtheria. Now, most of these people are wageearners in a small sense, and they are able to pay perhaps something for their medical attendance and they are able to pay something for antitoxin in the beginning; that is, fur curative purposes.

Now, if we were able to go through that street and immunize all of the children whose parents were willing that they should be immunized, we could practically shut off the diphtheria epidemic on that street.

I would like to know if we would be warranted by the State Department of Health in supplying a doctor with a sufficient amount of antitoxin and having him go through that street and immunize every child whose parents would allow it to be immunized.

We have felt a little hesitancy, as the State has been so good to us and furnished such an amount of antitoxin, and we have used so much of it, we have felt a little hesitancy in using it in such great quantities.

I said in the fore part of my remarks that we had 167 cases of diphtheria, and we have only had seven deaths. Our mortality up to this time has been very small. I think it has been very small largely owing to the fact that we have been able to use antitoxin, and largely because the State has so generously furnished this antitoxin for the indigent people.

Ten years ago, we had in the city of Rochester 661 cases of diphtheria reported and 268 deaths. Last year we had 112 cases of diphtheria and but 12 deaths; and thus far this year, with an average of more than 100 cases a month since the month of May, our death rate has been about five per cent.

I would thank Dr. Pease or the Chairman if he would answer the question as to the distribution of antitoxin to persons in moderate circumstances.

Dr. Pease—To be administered by your officers?

Dr. Goler—Either by our officers or by the doctors attending the cases, under our direction.

Dr. Lewis—I will answer that first, and if Dr. Pease wants to answer it afterwards, he can. I will answer that by asking another question: Would it not be well to keep on making requisitions for antitoxin under those circumstances until your request is refused?

Dr. Goler—If we have your permission, we will be very glad to do it. Then you will have to start a new antitoxin laboratory, as I said.

Dr. Lewis—No; we have enough to supply you. There are three or four questions here, some of which I feel perfectly competent to answer myself; and this is one of them:

"In the case of a nuisance to be abated, is it legal for a health officer to issue the notice?"

The answer to that was given last year by the gentleman who delivered the legal address, Judge Warner. The notice to be served by the health officer should be a vote or direction of the board of health in such cases. He may be the messenger who may serve the notice, but it must emanate from the board in order to be legal.

I take that to mean this: that in cases where you have adopted a sanitary code, as we have always advised you to do, the board of health passes the sanitary code and then the health officer is the executive officer and can proceed under that code in everything covered by it; but if an order to abate a nuisance is to be issued, or any action taken not provided by that code, the health officer is the executive officer of the board, and the board must take the desired action. That was Judge Warner's interpretation, and I think it is right.

Here is a question that I can not answer, and so I will let somebody else answer it:

"What is going to be done in enforcing the law in regard to vaccination of school children when the local board of health and also the board of education or school trustees refuse to act?"

Is Dr. Curtis present? In the Department, whenever we have anything that we can't do ourselves or can't explain or answer, we always refer to Dr. Curtis. I would like to have Dr. Curtis answer this question.

Dr. Curtis—I don't think I can answer anything that you can't, I am sure.

Dr. Lewis—What would you do if you were the health officer in such a town as that, in case the board of education or trustees refused to enforce the law regarding vaccination?

Dr. Curtis—And the board of health likewise?

Dr. Lewis—Yes, according to that question. I didn't know there was such a town as that.

Dr. Curtis—I should appeal to the State Department of Health. I see no other course to pursue.

Dr. Lewis—Could not the board of health order vaccination in such a case if there should be any danger of a case of smallpox traveling?

Dr. Curtis—I understood you to say the board of health was not in favor of it.

Dr. Lewis—Yes; I mean in a case where there is no smallpox, but when the school is open and the board of health and trustees agree not to enforce the law requiring them to vaccinate before admission.

Dr. Curtis—The health officer is anxious to have it carried out? Well, I find the health officers are very often more alive to the needs of a case and more earnest to have the law carried out than those whom the law puts in authority over them. I thought of that when Professor Landreth was reading his paper this afternoon in regard to the necessity of creating a public sentiment.

I think one of the great lacks in many of our communities is that of an enlightened public sentiment that is alive to the carrying out of the law. It seems to be an element that is against the liberal thought of this country and that would not be tolerated in European countries, the difficulty of getting the nonprofessional part of the community to appreciate the importance of these sanitary rules that we are so much alive to; and where public sentiment is opposed to a law it seems to be exceedingly difficult to enforce it.

It would be a very wise thing, it seems to me, if school children in some way could have instilled into their minds the vital necessity of these things that we know are so important and which ought to be carried out.

Where the board of health is in favor of it, it is a very common thing to have boards of public instruction opposed to the enforcement of this vaccination law, but the law is enforceable enough, and I suppose they can be compelled by due process of law to do that. The law strictly directs them to-day, in this State, to exclude from the public schools unvaccinated children. I don't think it is simply open to them, but open to any city which wishes to take the matter in hand and require the enforcement of it.

I don't know of any other way to answer that question—to compel those who are directed by law to do a certain thing, in some way, legally to enforce that law.

Dr. —— —I should like to ask if the State Board of Health has any jurisdiction in that matter, if an appeal of that kind was made.

Dr. Lewis—The State Department of Health has never exercised any jurisdiction over the enforcement of that law and never attempted to, except to advise health officers to secure the vaccination of school children if possible.

Dr. —— —This very question arose with us last winter and some of the parents refused to have the children vaccinated, and as we interpret the law, the school board have it in their power to exclude them or not if they wish, and they were not excluded and were allowed to go to school. I didn't know there was any law compelling anybody to be vaccinated.

Dr. Lewis—The law is very explicit that it is the duty of a school board to exclude children from school unless they are vaccinated.

Dr. —— —It states that very plainly, but when the board refuses, I don't know what we ought to do.

Dr. Darling (of Palmyra)—I am the author of that question, and perhaps it needs a little explanation. In our vicinity within the last eighteen months we have had considerable smallpox. We have had some cases within five miles of us, both east and west. The town board ordered the trustees of each school district in the town to cause each child to be vaccinated before entrance to the school. They were given the first two weeks of the school year to be vaccinated. On investigation less than half of the children of the town were found to be vaccinated. I appealed to the trustees and each individual trustee outside of the village refused to take any action whatever. I appealed to the State Superintendent of Instruction and the reply was received that, on complaint of some taxpayer in the district the trustee could be deposed and another trustee elected in his place. On a canvass of a few districts, we found the sentiment to be that we could not find any man to make any complaint. We could not find any man who would take the place of any deposed trustee and enforce the law, and the town board now stand waiting for further instructions.

Dr. Lewis—The Attorney-General has given us an opinion recently in regard to that question to the effect that the local board is perfectly competent to order universal vaccination all through the community in case there is any necessity for so doing to prevent the spread of smallpox. In other words, in a case like this where cases of smallpox exist it is competent for the board to enforce universal vaccination.

Dr. Darling—I would like to ask if we had authority or power and whether we could close the schools.

Dr. Lewis—You could close the schools if you thought it was dangerous to public health, the same as you could close a church.

Dr. Darling—We haven't the power of force of arms behind us in our district and public sentiment seems to be strongly against us; and we can not put each individual man in jail.

Dr. Lewis—No; I am saying what could be done legally. What is judicious to do must be determined somewhat by your surroundings.

Dr. Darling—I appealed to our county judge, and we have not been able to find anything in the law which would be effective and which could be put in force.

Dr. Lewis—I see we are getting more questions than we can answer before hearing Dr. Fulton's paper. There are one or two here, though, that can be answered in a word.

"A small stream runs through the village of Warsaw. Something above killed a lot of fish and they were strewed along the shores through the village. The village authorities claim they should be taken care of by the township authorities, and the town authorities claim that the village should. Which is right?"

They should be taken care of by the people where the fish were found. If in the village limits, they must take care of it. The other people could not come down there and operate in your locality.

"What system is usually followed in the cities in maintaining people sick with contagious diseases?"

I suppose that differs in various cities. In New York city we have a smallpox hospital where we take care of those cases and we have contagious disease hospitals where scarlet fever cases are taken, and even private patients may be taken to some of them. But Dr. Doty can answer that better than I can. I don't think you compel patients to be removed to a contagious hospital that can be taken care of outside.

Dr. Doty—In scarlet fever and diphtheria.

Dr. Lewis—If in a private family where the patients could be well isolated and taken care of, you would not compel them to go to a hospital.

Dr. Doty—Probably not, unless it was an aggravated case or in a hotel or apartment house.

Dr. Lewis—There is a question here as to how the necessity for the establishment of a sewer system can be determined.

It can be determined by the citizens themselves taking the initiative or the board of health taking the initiative and deciding that they will submit the proposition to a vote of the village; and the question is usually submitted, "Shall we have a system of sewage costing so much, Yes or No." After the taxpayers vote that they will or will not establish the system of sewers, the preliminaries are completed.

There is one more sewer question:

"Have a few families the right to combine and construct a private sewer emptying into the river, there being no sewer system in the village."

According to the law of 1903, a permit must be secured from the State Commissioner of Health before such a drain or sewer could be emptied into any stream, which being practically interpreted means this: If a village gave permission to a few citizens to open its streets and lay a private sewer, the plans must be submitted to the State Department and a permit granted and the plans approved, just the same as if it was the village itself which was building the sewer. Those preliminaries being complied with, we should approve of the system under those circumstances.

There is a State law, as you know, providing for sewers outside of an incorporated village forming a sewer district, but this would not apply in this case.

If there is any lawyer here I wish he would answer this question and then we will listen to Dr. Fulton's paper:

"Can a local board of health compel sewer connections? If so, by what procedure?"

Dr. Johnson, can you answer that question?

Dr. Johnson—I don't think I can.

Dr. Lewis—We better save that until morning. That is one of the questions we like to think over.

I now have the pleasure of introducing Dr. Fulton.

THE MANAGEMENT OF CONTAGIOUS AND INFECTIOUS DISEASES

BY DR. J. D. FULTON, OF BALTIMORE, SECRETARY OF THE MARYLAND STATE BOARD OF HEALTH.

MR. COMMISSIONER AND GENTLEMEN—In an unguarded moment, I promised Dr. Lewis that I would come to Albany. I made this promise several months ago. It came about in the same way that most of Dr. Lewis's enterprises come about—if you will sit down to lunch with him or ride thirty or forty miles with him on a railway train, you will do almost anything he says. So he got me up to Albany this morning and introduced me to you gentlemen this afternoon; and I must say that in introducing me he made the worst speech I ever heard in my life. It was scandalous, the way your Commissioner of Health talked about me in making me known to you gentlemen, and if I ever get him down in Maryland, I will try and do as much if not more to him.

He gave me this title for a paper: "The Management of Epidemics of Contagious and Infectious Diseases;" and when he comes to Maryland I am going to give him as big a one. That title reminds me of Jumbo's private car—a very fine and big car, liable to get stuck in a tunnel, however.

If I should interpret my title literally, and attempt to treat the subject in detail, we should all be overcome with weariness before I could impart to you any fresh interest or new ideas. I shall say very little about the dynamics of the subject, but as much as the occasion will permit about its ethics. I shall not undervalue the large powers with which you are legally invested;

these are indeed indispensable, but, even so, they are no more than tools, and unanswerable only to the purposes of clear brains and practiced hands.

To possess good implements with a knowledge of their use is not a complete preparation for your work; it is the most important point of skill to keep one's materials in good condition. Your material is the American public, a self-governing people, obedient enough to common sense and reason tactfully applied, but refractory as flint to coercion. I hope to keep this side of the matter most prominently in view while speaking to you to-night.

If I must address myself, as I suppose I ought, to those phases of local sanitary administration which are most perplexing, I think they are to be found in the jurisdictions administered without expert aid by one man. The health officer who looks after a large compact population has usually several assistants, and if his office is well managed its operations excite in ordinary times no more popular interest than do those of the police or fire department. Sanitary districts of less population density on the other hand are usually administered by one medical officer, who has no assistant and devotes most of his time to the practice of medicine.

A health officer is handicapped from the start if for any reason his official character is seen in public only occasionally. If the health officer can not put aside his private professional occupation and character for the period of his incumbancy, I think he ought to appear in both characters every day. A small community is about as panicky as the inhabitants of the brier patch, and the unfamiliar activities of a health board in the presence of epidemic disease often augment instead of quieting poplar fear. Indeed I have sometimes seen these semi-occasional health officers themselves in a state of noticeable excitement during emergencies, although in private practice they were cool and resourceful men. On all accounts it is very important for both health officers and the public to be habituated to routine sanitary operations such as even the smallest districts require.

It is possible for a sanitary officer to be too active, although I believe it is rather unusual. The American people professes little respect for authority, and delights to take a fall out of a bumptious official, but they easily acquire confidence in steady-going cool-headed leaders, and give such officials loyal support and obedience.

There are unobtrusive means of keeping informed about the health affairs of a community and simple methods of handling most emergencies. The safety of the public does not require, and common sense certainly forbids, the exercise of energy disproportionate to the peril involved. As a rule the people expect familiar diseases to be handled with far too little attention to details, and in the presence of unfamiliar infections they often demand excessively rigorous measures. For instance, I have known people to demand that the windows of houses where smallpox was present should be kept constantly closed and that the healthy inmates should be forbidden to take exercise in the yard. Once or twice in my experience local health officers have imposed such useless and harmful regulations.

Preventive measures should never include any step that ignores the welfare of the patient or the household. The operations should indeed be helpful to the infected household. I consider the common infectious diseases the material ready to the hand of every health officer for the routine training of the public into a recognition of the private as well as of the public value of preventive medicine, and the infective family should in every instance realize most fully the helpfulness of the local sanitary administration. The radius of influence of a single case or household is always short. Healthy people do not care much about the means of preventing disease unless a focus of infection is near at hand, and their interest in the subject disappears when the danger is past. You must therefore bring your influence to bear upon the right spot at exactly the right time.

OFFICIAL RECORDS.

From the beginning of his official life the health officer should make written notes of his daily work. The laws upon the subject often require written reports to be made at stated intervals, but it is the general rule that these reports are written at the end of the period, and from memory and from very scanty records. It is a common complaint in this country that health officers are poorly paid. So they are and so they will always be so long as, on the one hand, the public believe that health officers are not regular public servants but emergency officers, and on the other hand, the officials try to keep their activities down to a dollar's worth for each dollar received. The majority of officers in small communities can not show by the records at the end of a year that they have earned their salaries, although their work may have been exceedingly profitable to the community. Indeed the peculiar quality of a health officer's work is that if it were perfectly successful its success could not be demonstrated at all by such evidence as appeals to the popular mind. Therefore of all men in public employ, public health officers need most to keep a diary. Every single day should have its record. I doubt if any fiscal body however penurious could withstand the argument of a carefully kept record.

In the presence of an epidemic an American public is apt to be censorious, and in such circumstances the officer who has made systematic records has the best possible defense. It was recently my duty to ask a local board of health to remove their executive officer. Two sorts of incompetence were alleged. One was that he had allowed an outbreak of smallpox to progress without making notes of the dates or of the names of the number of patients, or of the number or results of his vaccinations, or of the names or number of his contacts and was therefore unable to give a reliable account of his operations. He only had in all fourteen cases of smallpox, but the State Board of Health believed nevertheless that these were twelve more than he should have had and that his outbreak lasted three times as long as was necessary.

It is perfectly obvious that a man of that sort can not be prepared against surprise, and, as I said before, can not make a convincing defense when he is criticised.

You must never leave the central authority unadvised of your operations. You should not only report at the legally prescribed intervals, but should send immediate reports of unusual occurrences. Your official news must outstrip the service of the daily press. Nothing can so inspire people at a distance with respect for your local administration, and nothing can so protect your town against undesirable notoriety, as the ability of the health commissioner of the State to speak by the book for your community. Hardly anything, I venture to say, irritates your health commissioner more than to receive from a newspaper reporter the news which he should have had first from a local health officer. The commissioner wants to be able to say to the man after a scare head, "There can hardly be anything in your story, for Dr. —— keeps us constantly informed," or else "There is not much of a story. Here are all the facts from the official sources up to last night."

The procedures against the spread of infectious diseases may be classified under several heads, as follows: Notification, inspection, immunization, isolation, quarantine, parole, disinfection. Time will permit me to give little more than mention to some of these subjects. We will take them in their logical order, beginning with

NOTIFICATION.

It is quite as important to avoid surprise as to prevent an epidemic, for the former often includes the latter; one must therefore utilize day by day every legitimate source of information. The notification law must be in operation all the time. These laws are designed for ordinary use rather than for extraordinary use. In so far as the familiar infections are concerned the notification law is allowed to fall into disuse, then when you most need the aid of its operation it will not work. When after a long period of disuse a health officer is obliged to enforce the notification law he is in an extremity about as bad as an epidemic.

Under such circumstances the health officer often confronts both these difficulties at once.

If the notification law is kept operative at all times the popular mind appreciates its necessity and its reasonableness. If, however, the law is dragged out of oblivion to serve in an emergency, great difficulties will be found in exacting a penalty for nonobservance. Courts will not, as a rule, punish a man for infringing a law which has long been winked at, perhaps forgotten. If it can be shown that the law was knowingly violated and that the consequences which the law seeks to provide against followed the violation, in other words, if a fully informed practitioner can be shown to have defied the law and to have involved the public in great danger thereby, you may secure a conviction if in addition to so much proof you can bring your case to trial while the public danger is fresh in the popular memory.

In Maryland we have a little plan of keeping physicians constantly in mind of the notification laws. Every man who sends a specimen for diagnosis to the State laboratory finds at the very beginning of his application blank this question: "Are you up to date in reporting births and infectious diseases?" If he overlooks this question he gets from the laboratory, instead of a report on his specimen, a note requesting him to complete his blank by answering this question. We have wounded the dignity of but two physicians in our rather large experience with this little requirement.

It is extremely difficult to enforce the notification laws upon an unaccustomed profession or public, but it is easy enough to operate such a law if the profession and the public have once learned that it leads to no unreasonable or burdensome intervention.

Private practitioners and private citizens are naturally suspicious that if a case of measles is reported to the health officer that official will immediately proceed to turn things upside down. I have seen people who expected and feared such a display of pernicious activity disappointed and even disgusted because it did not occur. I have observed also that physicians who pro-tested that the notification of measles was an unjust requirement because the presence of the disease did not justify any official intervention, afterwards criticized the health officer most severely because when cases of measles were reported he did not intervene.

The control of an epidemic disease lies in the management of the earliest recognized case. Unfortunately the earliest case is often not recognized, and this is about the commonest excuse that health officers have to offer for the occurrence of epidemics. The responsibility is referred back to one's fellow physician in private practice, who in turn is apt to resent the imputation and to make reprisals. Now it is perfectly just that the primary responsibility of correct diagnosis should rest upon the private practitioner. but there is a right way of placing it there.

It is an honored rule in the army and navy that matters of strategy and tactics must not be discussed with civilians, and a similar scrupulousness should be practiced by public health officials. Keep family differences inside the family. It will pay far better to accept all the criticism that the half-informed or misinformed public lay upon you than to speak to any layman about a practitioner's error of diagnosis. You need before all things the support of the profession, and you can have it by supporting the profession. Physicians are, as you may have observed. sensative creatures, and the way out of a delicate situation must be made easy for them. They seldom persist in an error from mere obstinacy; the consequences are too expensive. Once in a while an open issue must be made, but that is very rare, and can occur only with a stupid or ignorant medical man, or one who has been forced into an unpleasant attitude by some one else's indiscretion. It not infrequently happens that the mistake which lighted up an epidemic has been too long past to be reviewed by any one except the man who made it. In such a case it is best to say nothing about the origin of the outbreak however strong the probabilities may appear.

Under the head of notification the question of placarding should be mentioned. I am not convinced that the results of placarding are anything like so good as the advocates of the practice would have us believe. I believe that the scare placards which are so often used do more harm than good. If it is necessary to inform every passer-by that there is infection in a certain house it can be done without emblazing the landscape. An inconspicuous card in the right place will give ample warning. It will probably suffice to convey the information by means of a bulletin board at either end of the block, using one catchword in type large enough to be read without stopping and printing the addresses in smaller type. In most places the laws require placarding and I do not wish to be understood as disapproving the practice. I only say that its benefits are not clearly proven, while its disadvantages are well known.

INSPECTION.

The distribution of circulars such as the State Health Department provides is, I am sure, an effective means of enlightening the public mind. The wholesale papering of a community with such leaflets is not profitable, but in the infected houses and their immediate vicinity they do a great deal of good.

Inspection is in most places the routine step next in order after the presence of an infectious disease is reported, and useless inspections are still in vogue in some very enlightened cities. There are certain popular delusions about the infectious diseases which health officers ought to set their faces against, but which are rather kept alive, I fear, by health officers. For instance, it is the time-honored but absurd custom in many places to inspect the back yard and the house plumbing whenever a case of infectious disease is reported. An outbreak of scarlet fever or diphtheria or of any other disease of this latitude, typhoid fever and malaria excepted, has no relation whatever with the condition of the back yard or of the plumbing. There are good reasons for police inspection of back yards, but the existence of infectious disease is not a decent pretext for such an inspection. I have known weeds cut, ditches put in order, and cats killed in order to stop the spread of infectious, but I have never known these things to do any good. The decencies ought to be preserved at all times for reasons quite apart from public hygiene, but to fight infection by mere guess work and superstition in these days does positive harm by diverting the public mind from the rational and effective means of prevention which modern science has supplied us, and by keeping alive false beliefs which should have been long since dead.

Inspection is not always in order upon the notification of an infectious disease. I am inclined to think that in cases where the more stringent sorts of isolation are not necessary, inspection is also unnecessary. Take the common infections of childhood for example. The safety of the family can generally be left in the hands of the attending physician without any personal supervision on the part of the health officer, and outside the household a good defense of the schools will about complete the necessary precautions.

In the presence of diphtheria every throat in the household ought to be inspected and cultured. This is an absolutely indispensable step, and unless the attending physician can and will do this promptly, it should be done by the health officer. Outbreaks of diphtheria often raise an important question about the management of public schools. If the number of cases is considerable some one will be sure to suggest that the schools should be closed. It has often struck me as curious that health officers will sometimes treat an infected schools in a way precisely opposite to their way of dealing with an infected family. To send all the pupils their various ways without heed or caution seems to me a very ill devised method of controlling the spread of diphtheria. The hygiene of diphtheria is absolutely specific. Its presence can be recognized before symptoms appear, and its progress can be stopped almost preemptorily. When an outbreak definitely involves a particular school, the assembled pupils in the school room offer the ideal opportunity for the health officer to become accurately informed as to the amount and location of the threatening infection. Every throat in that school should be inspected and cultured. Children from infected houses being excluded, and the children with reddened fauces sent home, the school can continue work with no more danger than the children would probably encounter at home or on the street. In twenty-four hours after the specimens have reached Dr. Pease's laboratory, the health officer should be in possession of all the information which for the time being he needs, and if he has antitoxin enough, he may cut the outbreak off exactly at that point.

House inspection is always necessary when one intends to confer a specific immunity upon susceptible persons, or when one must impose serious restrictions upon personal liberty, and rarely it is necessary to make house-to-house inspections for medical observation of contracts, or for the discovery of concealed cases or those not under medical care.

IMMUNIZATION

Immunization is a preventive measure about which we shall hear more and more in the future. At present it is available against but two diseases. Under the name of vaccination, immunization has a century-long history during which smallpox has declined from a mortal terror in the eyes of our forefathers to a mere tradition of ancient fear, a thing scorned by the heedless of our own day. The medical profession itself has grown ignorant of the disease, and even the features of vaccinia, familiar to those of but a generation ago, are most imperfectly known by the medical men of the present. Having no means of realizing the horrors of that plague from which we are delivered, it is not strange that to the lay mind of to-day the truth about smallpox and vaccination should seem but a dying superstition.

Immunization on a large scale against typhoid fever, cholera, plague, and tuberculosis may be among the gifts of medical science to the preventive medicine of the next quarter century. But we have now, full grown and ready for active service, an immunity which bids fair to rival vaccination. About fifty years ago diphtheria became so large a factor in the mortality of this country that wise men believed that it must become the most remorseless agent of untimely death. In various parts of Europe it had acquired a variety of popular names expressive of its frightful energy. Since 1893 all this has changed. Practitioners of no longer service than my own have ineffaceable impressions of the disease as it appeared before antitoxin was given us. The young practitioner of to-day can not possibly become acquainted with the diphtheria as we knew it twenty years ago and earlier. Even in special hospitals for its treatment he can scarcely glimpse its worst features. What youngster has seen a family wiped out as I have? We do not find, however, that antitoxin has been as freely used in public health work as it should be. Its free use offers by far the speediest, most economical method of terminating a diphtheria outbreak. In many places it is supplied at public cost for the cure of cases, but not for immunization. To my mind this sort of discrimination is gross extravagance. Antitoxin promptly and freely used makes epidemic diphtheria impossible.

ISOLATION

Isolation is generally held to mean the separation of the sick from the susceptible. Practical isolation has many grades of severity. A case of malaria is perfectly isolated when surrounded by a mosquito barrier. Smallpox in the other extreme requires the most rigorous isolation that is, removal from the home to a special hospital. I do not know what you can do in New York. but in Maryland whenever it has been tried it has been entirely successful. The prime essentials to success appears to me to lie not in the strength of the law, but in the fitness of the hospital. and the tact of the officials. Moreover, I am fully convinced that hospital isolation of smallpox is much the cheapest and most satisfactory way of handling outbreaks of smallpox. I have observed, too, that unprepared communities which on the occurrance of one or two cases of smallpox made expensive preparations for the segregation of all cases, did not grumble when their outbreaks were cut very short. On the contrary, they were often quite proud of their promptness. Other places gave them ready standards for comparison, and business men were particularly gratified that the least possible disturbance of their affairs had resulted.

DISINFECTION

Immediately after the removal of a patient to hospital or after recovery or death, if treated at home, the house is ready for disinfection. I shall pause only long enough on disinfection to say that the health officer should make careful observations upon the radius of influence of every case. The striking distance of infection in a laundry, for instance, is much longer than that of the same infection in the home of a professional man.

Dinisfection should be done by an approved method and should be checked in every instance by laboratory tests of efficiency. Disinfection should be done by careful persons and if possible by expert persons. This is not always the rule even in large towns.

There is a word commonly used in this connection which I should like to see abandoned. It is fumigation. The employment of this word keeps alive the misplaced confidence of the public in a good many substances which have more effect upon the respiratory tract of the casual observer than upon the specific organisms which ought to be destroyed.

PAROLE

The treatment of exposed persons includes sometimes, perhaps oftener than is wise, their strict isolation. Taking smallpox as an example, the common practice of keeping smallpox contacts away from their employment and secluded from the public for twenty days seems to me unnecessary. Whenever you are dealing with a class of people whose material interests are substantial enough to keep them within the district, you can handle contacts quite safely by means of parole. Let us suppose that smallpox has been discovered in a boardinghouse or in a factory. After the removal of the case, the disinfection of the premises and clothing, and the vaccination and revaccination of all exposed persons. it is perfectly safe to allow every contact to attend regularly to daily work, and to go about at perfect liberty, provided that each person will engage to report daily at a stated time and place for medical inspection, and that in case of failure parole shall be forfeited and isolation substituted with the aid, if necessary, of the police.

Practically all classes of persons above vagrancy can be handled upon this plan. When persons are kept under observation, whether on parole or not, every individual should be accounted for every day, and the memoranda should be written. When one employs parole in a small community for the first time in handling smallpox, the plan is likely to receive some popular criticisms. But if you make your daily observations scrupulously, you will get, besides the main thing, the control of the disease, three other desirable results; first, the persons under observation will respect the reasonable restrictions upon their liberty; second, the general public will gain confidence by a near view of your orderly methods; and last, you will have made a complete history of your outbreak while it was in progress.

I have said nothing about quarantine. The useful features of quarantine are properly included under isolation, and what remains of quarantine after that is not worth saving. Within the bounds of this country quarantine is of no use except as a means of punishing negligent or defaulting communities. The sort of quarantine which is occasionally resorted to in the yellow fever belt of this country, and such as smallpox sometimes brings into play in the north, is not only worthless as a preventative measure, but is also a disgraceful commentary upon the knowledge and practice of public hygiene in whatever locality it appears.

Now, Mr. President, I have concluded my talk, and I want to say to you that I have gotten what I came to Albany for. You may be disappointed, but I am not. I came here to see this convention of sanitary officers. I have seen it, sir, and I hope to have a thing of that sort in Maryland. [Great applause.]

A Member of the Conference—Is it right for a board of health, when they quarantine a family, to mention on the card what the disease is?

Dr. Lewis—It is customary, Doctor, if you card at all, to announce the disease. I suppose that is correct. I am very much of the same opinion as Dr. Fulton about the utility of this notification by cards on doors, etc. I never would use one, and if I had I would not do that. People always find out whether there is a contagious disease in a house or not, without much trouble.

We expected that Dr. Doty would not be able to attend tomorrow, but he is now here, and he is ready to address this meeting on the subject, I suppose, of Malarial Infection. I don't know, really, what his subject may be.

Dr. Doty—I rather expect to be here tomorrow.

Dr. Lewis—Then Dr. Doty should discuss Dr. Fulton's paper.

Dr. Doty—I think, now, we understand more fully that infection is not conveyed in the breath or air or the clothing of well persons that is, the clothing commonly worn by well persons, but through contact, personal contact, and that the opening of windows, while it not only is almost absolutely necessary in helping the person who is sick, does but very little or no harm at the outside. I think that is the practical experience of all who have looked it over carefully, not in theory, but in practical work. I have yet to see a case where the disease was contracted by being near an open window or in the immediate vicinity. I know those cases have been cited, but I have never seen them.

I am quite certain that, if you have gone into this matter carefully in the past five or six years, you will endorse what I say when I make that statement: That the air and the clothing worn by well people is not a cause of infection. It seems to me that is one of the most important things Dr. Fulton says, and I thoroughly agree with him.

Dr. Willard—Dr. Doty has just said that the poison is not conveyed by means of the air or clothing. I attended a case of smallpox where the patient stood, not near the house, but against the fence which was around the pesthouse, for a few minutes, not knowing that it was the pest-house, and talked with inmates who were standing at the window. He was very tired and had not eaten any supper at the time and he went away—some one came along and said, "You better get away from there. That is the pest-house, the smallpox house." He came down with the smallpox. That was the only exposure he ever had.

Dr. Lewis—How long afterwards did he come down with it?

Dr. Willard—He came down with it in about twelve days.

Dr. Doty—How close was he to the house?

Dr. Willard—I don't know exactly.

Dr. Doty—I think that has a great deal of bearing on it.

Dr. Willard—The house was in a small enclosure. He probably was not within fifty or one hundred feet.

Dr. Doty—I have never seen or noticed a case of that kind.

Dr. Willard—That was all the exposure he had. He was on a boat and went ashore to get vaccinated and worked all day and was very tired, and walked along and came to this house and stood by the fence and talked to the inmates and went home.

Dr. Doty—Presumably those cases in the pest-house were not the only ones in the city.

Dr. Willard—I made inquiry and found that the wind blew directly from the direction of the house to where he stood.

Dr. Doty—I think the important thing was the exclusion of other means of communicating it. You will find that the cases which had not been under observation—that is the worst kind for transmitting the disease.

Dr. Darling—There were no other cases in that city except those in that house.

Dr. Doty—Are you sure?

Dr. Willard—As far as I can learn.

Dr. Doty—That is what I want to bring out. I have seen many cases where the disease probably came from that source or some similar means, but I have also found some time afterwards that there have been unknown cases, mild cases, which have been walking around in the immediate vicinity.

Dr. Willard—I made all the examination I could. Another case that I know about, where the bed that a smallpox patent was sick on was burned, and a man driving along the road at least five hundred feet from where they were burning the bed, the smoke blew across to where he was and he inhaled the smoke, and he remarked that it had a bad smell, and he came down with smallpox and died of it.

Dr. Doty—Doctor, I have been in this work for twenty years and I never knew of such an instance, and to my mind it seems almost improbable.

Dr. Willard—That was the only case in the town.

Dr. Doty—I mean to say that from my standpoint it is impossible to do it. If it were so, we would never get through with the district.

During the typhus time, I had charge in New York city and I had under my jurisdiction about one hundred and twenty-five doctors, and at that time we had about six hundred cases of typhus and probably the same number of smallpox. These men had ambulance drivers and helpers who were continuously handling these cases, carrying them from the houses to the hospitals. We had no restrictions whatever as to what they were to do, and there is no question that those men when off duty went directly to their homes. That continued during the winter, and in order to see what effect the clothing of a well person would have, I kept constant observation over the families of these men, and not in one instance did we have a secondary case. There were one hundred and twenty-five men in day after day with cases of typhus, which is probably one of the most infectious diseases, handling them and carrying them into ambulances and then going to their own homes, and there was not a case where the disease was carried in the clothing of these well persons.

Dr. Willard—Will you explain how, in the second case, this man had been exposed and learned that he had been exposed and came home and told the doctor he had been exposed, and preparations were made, and he was treated in a very large barn, with double doors right through; and he was not sick in the house at all, but in the barn; and after he got well his bed was burned up; and this man going home on the road was at least five hundred feet from where the bed was being burned, and he was the only man in the neighborhood who had the disease, except the other man who came home, knowing he was exposed. Those were the only two cases in the town.

Dr. Doty—I do not undertake to say that there are not instances where a person may not become infected from being near a window where there was a case, or something like that. Nor do I say it is impossible for a well person entering a room where there is smallpox to go out and communicate the disease; but I say it is exceedingly rare, and I am perfectly certain that if it were a fact and such things happened, we would have no end to an outbreak.

My experience has been that where these unusual cases are cited as having contracted disease from being near an open window, etc., that those were not the only cases in the vicinity. There are others, and before we accept that as the medium of infection, we have got to be sure there was nothing else in the vicinity. It is almost impossible to-day.

I speak forcibly in the matter, because I have seen these cases where it seemed almost sure that they had contracted the disease in some such way, and at the last moment we have found a case which never had been found before—a mild case, which had been walking around. And the thing has occurred so many times that, while I do not say that the disease may not be contracted that way, it is reduced to the minimum and is hardly a factor in an investigation of this kind.

I don't approve at all of being near an open window. We ought not to allow that; but it is not right to sit down and accept that as a means of infection. We should try and see if there is not something else, and as Doctor Fulton has said, the worst part of it all is to find the first case, and that we shall not find if we accept these obscure means of infection. We should go deeper into it.

Dr. Willard—In the second case I mentioned these were the only two cases which occurred in the neighborhood.

Dr. Doty—They, of course, may be the exceptions.

Dr. Harris (of Newburgh)—In regard to smallpox, if Dr. Doty goes as far as he does, and says it can not be, I have got to disagree with him. I know of a case where a watchman, taking care of cases, developed smallpox, through contact with the air, and he was not nearer to the patients than Dr. Doty and I are standing now.

Dr. Curtis—I think we should get all we can from Dr. Fulton. I would like to ask him a question which sometimes comes up: How far would he locate a smallpox hospital from dwellings?

Dr. Fulton—I think the community usually settle that question, by having the smallpox hospital put as far as possible from the town, as far as a convenient site can be secured.

It is best to be provided for before the smallpox outbreak occurs.

I would say, however, that the largest smallpox hospital in Maryland outside of Baltimore city is at Cumberland, a town of about 15,000 inhabitants. It is on the poorhouse farm. It is within five hundred feet of the almshouse, which has a department for the care of the insane, and that the recreation grounds of the inmates are at a less distance than that, they are nearer to the smallpox hospital. The county road passes within about two hundred feet. The smallpox hospital has the same private water supply as that belonging to that farm.

The service is absolutely different; no employee of the almshouse or insane hospital goes down to the pesthouse. The only barriers are two fences, one a barbed wire fence, an up-and-down picket fence nine or ten feet high, with wide cracks. The smallpox hospital occupies a position slightly down a hill from the almshouse and on the edge of a ravine, and on the opposite side of the ravine is still another county road.

The largest part of the smallpox cases that have occurred in Maryland since 1898 have been housed in that frame building. The inmates of the insane asylum and the poorhouse have been perfectly safe throughout all that time. All the visiting days have gone on just the same. Visitors have been obliged to go right alongside the pesthouse. It is within a mile and a half of the city, but near the almshouse, and there has been visiting, and nothing has happened.

With respect to the aerial infection of smallpox, I do not think it is quite safe to act on the belief that it can not be conveyed through the air.

It is, as Dr. Doty says, an extremely difficult thing to prove, and it is a matter upon which I have myself great scepticism, but I think we ought to keep open minds on the subject, as practical men.

But my contention would be this (if I might speak after I have answered the question) my contention about closing windows would be this: That, even if I did believe in aerial infection of smallpox, I would still consider the tight closing of windows and the prohibition of exercise in the yard of well people or convalescents an unreasonable and perhaps harmful precaution; because in any event, it does not cut any large figure in the causation of smallpox, and the private individual has certain rights. The community is bound to carry part of the danger of that infection. But I think that the community exacts entirely too much of its citizen in quarantine if it expects him to shut up his doors and windows and lesson thereby his chances of recovery, if he should have a severe attack.

Dr. Doty—Mr. President, I want to just make emphatic what I said before. Although my belief is, as I stated, that this aerial infection rarely occurs, I do not mean to say that it may not occur, as I replied to the Doctor; and so far as the distance is concerned, that is something which I think no one can compute. All sorts of distances have been given, from five feet up to a hundred; but the force of the thing is that a great many are only too ready to accept that as a means of infection (having been near a pesthouse, or something of that kind) and it quiets the community or the health officer to think that is the cause of it, whereas he ought to be looking for the first cause by a house to house inspection.

Although it may occur in close proximity, I do not believe it is much of a factor in the transmission of smallpox.

Neither do I believe that the clothing of a well person will communicate the disease—a well person may visit a case of infectious disease, and may meet in the hall someone else and possibly convey the disease, but to go out into the air and go to his home or other people's homes, as a doctor will, I don't think it occurs.

Dr. Harding—On this line, I would like to state a case which we had in New Rochelle. A man was confined in the White Plains jail as a prisoner. The day he was released from the jail, they found they had smallpox in the White Plains jail. That man had been vaccinated, and on going back home, within two weeks three children in the house in which he lived came down with smallpox. There had not been a case of smallpox in the town in six months, and the children had been living there right along; and we can not conceive of any other way than that he brought it.

Dr. Doty—That probably shows that the man brought infected clothing home. That is all right. That is not antagonistic to what I say. I say the clothing which a well person wears; this was practically the same as the clothing of the sick, as it was taken from the infected area.

Dr. —— —A family living perhaps a quarter of a mile from the village contracted the smallpox through the agency of a young man who had an overcoat which was left in a closet in a house where there were cases, and although there was a quarantine, he surreptitiously obtained that overcoat, supposing that, having been shut up in the closet, it was perfectly harmless.

Dr. Doty—That came from the infected area.

Dr. —— —They insist that the closet was kept closed up. The only article that was taken out was the overcoat.

Dr. Doty—To show the way in which these things have originated: During the Spanish war the Southern people were very much exercised over the disinfection of clothing, which I was unwilling to do with soldiers coming home from the South. I was very certain (although at that time we did not know about the mosquito) that the clothing of well people coming from the yellow fever infected area does not convey disease. Soldiers coming home on the transports I passed without and disinfection whatever, provided they were well.

In the South they made every effort to force the city of New York to disinfect those. I declined to do so.

During the following winter it seems a number of these soldiers went South. The following summer an epidemic occurred in one of the Southern States, and the health officers, after going over the thing very carefully indeed, came to the conclusion that that outbreak was due to a coat which was worn by a well man who passed my quarantine and went South, and it was hung up in an icehouse during the winter and was taken out in the spring. Those men were perfectly certain that that was the cause. In order to find out whether that story was true, I wrote South and asked them if that same man whom I had passed as a well man, and who had hung up his overcoat in an icehouse, was the cause of the outbreak the following year; and they wrote that that was the cold fact.

Those same people to-day have given up the disinfection of clothing, because they know it was not the cause.

There was a case where they were perfectly certain it was the coat. To-day they find it is not the case; and that is even so as to the transmission of the disease by the air and clothing worn by well persons. I think, sooner or later, we will find that that is not the fact, except in occasional cases. With clothing coming from the infected area it is different, and the case of the doctor from New Rochelle is different; but the clothing worn by a person who would go into the jail and go out and go to his home—I don't believe, in ordinary cases, that would be a cause of infection.

Dr. Lewis—The hour is getting late enough for us to adjourn, but there will be an opportunity to continue this discussion tomorrow morning through the question box, which will be open to us before the first paper in the morning, that paper being by Dr. Soper, on the Management of Typhoid Fever Epidemics. Dr.

Soper, having had charge of the typhoid fever epidemic at Ithaca, knows something about typhoid fever. After that will be a paper on Tuberculosis.

We will call the meeting as promptly as possible after 9.30.

THIRD SESSION

FRIDAY, *October* 9, 1903, 9.30 A. M.

The third session of the conference was called to order at 10 a. m., by Commissioner Lewis, as follows:

Dr. Evans, being obliged to leave at an earlier hour than was expected, has been assigned the first place on the program, so we will now have the pleasure of listening to Dr. Evans, of Chicago. [Applause.]

PROPHYLAXIS OF PULMONARY TUBERCULOSIS

BY DR. WILLIAM A. EVANS, OF CHICAGO, PRESIDENT OF COOK COUNTY MEDICAL SOCIETY.

MR. COMMISSIONER AND GENTLEMEN—I am glad of the opportunity to meet the health officers of the State of New York. At first flush it would seem a little peculiar that a man should be invited here from a State which has done so little in the solution of the tuberculosis problem to talk with you, perhaps, in the capacity of an instructor, to talk to you, citizens and health officers of a State which has done so much in the solution of this question. I am aware of the fact that some of the great private institutions and semiprivate institutions that are doing so much toward the elucidation of the problems of tuberculosis, that are doing so much to bring American medicine into good repute, are located in your midst, and I am also aware of the fact that your State is one of the earlier of American States to recognize the obligation toward its tuberculorii and its nontuberculorii subjects.

Whatever the reason may be why I am here, the fact is that I am glad to be here. I am glad to be here because I am learning something of the operation of the schools for hygiene, and this information is information that is a value to me, and of value, it would seem to me, to everyone who is privileged to listen to the communications that are read and that are discussed in these bodies. I am doubly glad to be here because during the twelve hours or more that I have been your guest I have learned much, not only from the speeches that have been delivered from the rostrum here, but also from the discussions from the floor, practical questions, vital questions, questions portraying daily difficulties, nevertheless difficulties that are of great moment and pregnant with possibilities to the community. Therefore I thank your Commissioner, and I thank you for the opportunity of being with you to-day.

I will divide what I have to say into two portions: 1st, means of prophylaxis, and 2d, necessity for it. To discuss all means would probably necessitate too much detail of statement: would be uninteresting and would defeat the end for which I believe I have been brought to Albany.

In general, the prophylaxis of tuberculosis comprehends the whole of hygiene both of the community and of the individual. It can not be comprehensively discussed without discussing tenements—yet tenements are proper subjects for discussion—diphtheria and every other hygienic question.

Then there is the question of occupations, another general question of hygiene. Bowditch, of Boston, laid much stress on soil moisture. The English, in fact, everybody, now talks much of soil moisture and tuberculosis, but certainly this question belongs to the general subject of hygiene and not especially to tuberculosis.

There are a few points, however, that I wish to emphasize, for I take it that is my function here. Yellow fever, thanks to the American brains, has been driven from Cuba; not permanently, but just so long as *we* do the driving.

How done; One principle.—The sick man is the menace. Mosquitoes must be kept away from him. As you know, the effort to kill mosquitoes is not succeeding. The malarial question will be met when we regard and handle the malarial man as a menace. *Regulate him and let anopheles alone.* And as to tuberculosis the same thing is true. This does not lead to phthisophobia. Any problem looked squarely in the face is quickly understood. Phthisophobia springs from ignorance—from little knowledge. The cure for this is always more knowledge.

> "Shallow draughts do but intoxicate the brain,
> Whilst drinking deeper *sobers* it again."

The question is what shall we do with the patient. In America, I take it that the predisposed must always be left to his own initiative. This is equally true of the man whose parents have died of tuberculosis and he who is prone to it by reason of a deep, narrow chest. Investigations (of Woods Hutchinson, of Evans and McHugh) show that the tubercular chest is deep and narrow. It does not materially alter this question that the type of chest in the poorhouse is of the same type. As I said a moment ago, the predisposed man in America, for many years at least, must be left to his own devices. The sick man is another question. First, we must know him. Shall we have registration? I should say, yes. Biggs is right. His opponents are wrong. Once registered, what can be done? In my judgment, for many a year at least, the main thing will be education. The most impressive, the most effective educators are the sanitaria. These institutions justify their existence by arresting the disease in 50 per cent. of the cases, arrests which become permanent cures in 80 per cent. of that 50 per cent. They justify their existence by removing sources of contagion from shops and houses. But above and beyond this, the great work of these places is as colleges and extension centers.

I pass over the question as to the nature of these institutions. I approve the idea that they should be of two characters—one for mild cases and one for severe cases. However, in my judgment we are rather too hasty in solving the question of mildness. I know of no way of settling this question short of weeks of adequate observation. Its solution requires consideration of temperament, natural resistance, digestion, disposition toward sclerosing processes—these as extent of disease or location in one or both lungs.

If you would allow another observation, it is that we are thinking too little of the institution in which we can never get statistical or other demonstrable result—namely, the hospital for severe cases—the place in which the great foci of possible infection are made harmless. I would like also to place some emphasis on one other potency, namely, the dispensary. This agency is usually neglected. I think that it is inadequate in the great city of New York. I wish to tell you something of what we are doing in Chicago. Our plan has many shortcomings, but it also has a few good points. Our city health department is not in a position to do anything. It does not register tuberculosis, does not examine sputum, nor disinfect any but the worst of tuberculosis premises. We have an investigating bureau in that city called the Bureau of Charities. This body has twelve offices in different portions of the city. These offices investigate the people of their districts and have a card system giving information as to large numbers of people. We have another body called the Visiting Nurses' Association. This organization furnishes nurses for a portion of a day to the needy. These nurses are assigned to divisions of the city. These two organizations work together, using the same machinery in many instances and exchanging data. Into this partnership, the Tuberculosis Committee have come. They maintain a central office. Their branch offices occupy the quarters of the Bureau of Charities. The idea is to make each branch office a small tuberculosis dispensary. The nurses in their rounds and the charity officers in the discharge of their duties get track of cases. These are sent to the branch office to see the division doctor or visited at their homes by that doctor. Two cards are made out by the doctor. One gives data as to the sick man's surroundings, material circumstances and environments. This is the economic card. A second card is known as the clinical card. The division doctor restricts his services to diagnosis, gathering of economic and clinical data and recommendations as to personal family and community hygiene. These cards are filed in the central office. From them house, street and other data are classified. Should the patient be poor or without a physician from other cause, the district doctor may attend the case, charging or not for his services, as the case warrants. The division doctors are furnished to us by the Chicago Medical Society. I may say in passing that the

Chicago Medical Society is trying to evolve a plan for the systematic and organized care of the needy. Subsequent observations of the patient, the infected premises or the friends in contact, form part of the work of the nurses and the agents of the bureau. If the patient dies, the nurse reports the condition of the premises to the central office and they interest themselves in disinfection. These various bodies are able to assist the needy to better food, better homes and better climates. In time they will have maps of streets, premises, trades and occupations. They try to teach the sick and their families. The doctor in this way is most ably assisted by the nurses. The district doctors and the nurses are trained at the central office to the end that all reports, both economic and clinic, are uniform in classification and phraseology. They maintain a corps of lecturers who deliver popular lectures. They furnish leaflets and other reading matter. This is the work they are just entering on. It is not ideal. It is not adequate. They are feeling their way just as you are and what they do and what they have done is a striving for the ideal. They offer you their plan—a modification of the Calmette plan. They ask your candid criticism of it.

Dispensaries, Hospitals and Sanitariums, Great Educational Institutions.—But, as to other means of prophylaxis. The patient is a potential, harmful agent. His excreta is actively dangerous. In all major considerations, all excreta can be eliminated, except the sputum and probably the respiratory fogs and mists.

What shall be done with the sputum? That depends upon where you are. In our consumptive hospital the cups are placed in a steam sterilizer and heated with 15 pounds steam pressure. This not only kills bacteria, but it destroys the viscidity of the muscus, so that the cups empty without any difficulty. But this method is but of limited application. We will dismiss certain methods with brief consideration.

1st. Paper sputum cups. The aggregate cost of these is prohibitive.

2d. No form of chemical disinfectant is practicable at the present time.

3d. The burning method is capable of wide application and is probably the best thing to do under ordinary circumstances. In every household there is a fire during at least one-third of the waking hours of the day. Papers and clothes can be thrown into the fireplace to be burned when the fire is lighted.

4th. Shall the sputum be thrown into the water-closet? Koch, Mosler, Von Leube and Lubarsch have shown the tubercle bacilli will be choked out by the bacteria which move, feed and propogate in such watery low temperatured places. Mausehold and Moeller have discovered that bacilli emptied into the sewer remains active and pathogenic for a long time. What can we decide if the sputum is to go on the ground in a city, or into the closet? The closet will be the better place for it. I say on the ground in a city. By this I mean that the ground in a wet shaded place is bad. The ground in a sunlit spot, especially be it sandy, is not so bad. I need hardly say that spittoons should be plain, easily cleaned, easy of access without acrobatic expectorating necessities.

I wish to put a gerat deal of emphasis upon a phase of prophylaxis that probably has never occurred to you. It is the necessity of candor with your patient and with his friends. A tubercular patient should be told frankly of his condition. A policy of deceit is always dangerous to the patient and to the community. I believe it to be axiomatic that no markedly tubercular patient ever got well, without being told plainly his condition. It is needless to say that it is absolutely impossible to safeguard the community, the friends and even the man against reinfection and disseminated infection. If your patient, temperamentally or constitutionally, is incapable of a fight, you still have to consider the rights of the community—and who has the right to say that any patient is temperamentally and constitutionally incapable and doom him to die without an effort?

But the broader view can not be lost sight of. The community can not be protected from a patient ignorant of his condition, any more than the community can be protected from a smallpox patient without allowing him to know his condition.

The next point of prophylaxis is earlier diagnosis. While diagnoses are made at an earlier stage than formerly, there is yet room for real improvement. Seventy-five per cent. of diagnoses of this curable disease is not made until it has become incurable. Let us look at it from another standpoint. Rejecting the extreme figures of Naegeli and making use of the middle ground statistics of Tatham, we find that of the people of England dying of diseases other than tuberculosis, 22 per cent. show tubercular lesions.

Let us use these figures. Take 1,000 people: 125 of them will die of tuberculosis. This leaves 875 dying of other diseases. Of this 875, 22 per cent., or 192, will show tubercular lesions at autopsy, a total of 317 cases of tuberculosis, of which 192, or 65 per cent., were not diagnosed. Let us assume that half of those 192 cases had known of their tuberculosis; yet for some reason or other it did not appear on the death certificate. We still have one-third of the cases of tuberculosis undiagnosed.

You say with some justice that from the prophylactic standpoint these cases are of minor import. But you can never have a rabbit pie until you catch your rabbit. With early diagnosis, cases can be cured, and that is well for the patient and the community. Spitters can be headed off and that is always well. Numberless details could be cited. They would only detract from the maxim, "Early diagnosis is a prophylactic procedure." How shall this be accomplished? By tuberculin. My observation and experience are that in early tuberculosis there is but 4 per cent. of error in its use. In the same 30 cases by physical signs or by sputum examination the error is certainly five times as great. The opponent of tuberculin would say better physical diagnosis and public sputum examination. The latter is a little difficult to get. but it is easy compared with the former. Not in the next quarter of a century will the general practitioner and the country doctor be able to make diagnosis of prefibule tuberculosis in 50 per cent. of his cases. Tuberculin can be used in the hospitals, dispensaries, on private patients and in ambulant cases. It requires no technical skill and but little experience in interpreting. It is not dangerous, certainly not to any prohibitive degree.

There is only one question of general hygiene on which I shall touch and that is ventilation. The question of tuberculosis can be writ in the word "house," and the major reason for this is ventilation. I can not be emphatic enough here. Sanchó Panza has said "God bless the man who invented sleep." The proprieties demand that I modify what I should say so as to read "Hang the man who invented the dread of drafts." He has slain his millions. He is the grim reaper. Expired air is an excretion. It is laden with excretory products. If I were even to hint that urine, faeces and other excretory products should be drunk, I would be classified as unmentionable, and yet who does not breathe excreted air? If further proof be needed, the two great captains of death are tuberculosis and pneumonia—30 per cent. One-third of all the people die of diseases of the lungs. Brehmer wrote: "Anything which protects one man from falling ill, must be able, if properly employed, to cure another of the same disease." This aphorism with all its error is yet true with relation to ventilation and tuberculosis.

What shall we do about our milk supply? In the present state of information, I think it is inadvisable to do anything. I think that Ravenel, Pearson, Solomon and numbers of others both in and beyond our country have proven that bovine and human tuberculosis are interchangeable; that there is some danger from drinking milk from tubercular cows. But after this is said, Moch's statement remains true. He said: "The fight with tuberculosis must aim at shutting off the chief (indeed we may say almost the only) source of infection. This is—those consumptives who in consequence of the unfavorable conditions under which they live or because they obstinately set aside the simplest rules for the prevention of infection, are a danger to their companions. In some way or other we must look after these sick people."

My reasons for advising against prophylactic efforts so far as the restriction of infected herds is concerned are these: 1st, This method of infection is of secondary importance; 2d, It will provoke the maximum amount of opposition, because,

a. In several States the judiciary are opposed to it.

b. It opposes a concrete property right against an indefinite public sentiment.

c. The question is regarded as *sub judice.*

Under these circumstances it is well to handle this *phase* of prophylaxis with great tact.

The second division of my subject is the necessity for prophylaxis, and this question is essentially the question of the cost of tuberculosis in lives and in money.

Now what represents the wealth of nations? It is not strife between States, between communities, between individuals. It is the difference between the export and import trade of a nation. The material resources, therefore, that have made this country rich beyond compare, rich beyond dreams among nations, is due to this matter of annual exports. Yet I say to you that the amount we export to the markets of the world, with all our vessels filled with grain, with all the products of our factories, does not exceed the annual cost of tuberculosis to the people of this country. The figures are even worse than this. You are told each tubercular subject is sick or incapacitated for a period of more than one year of time, yet this does not give us the actual value to the State.

I have collected some statistics on this subject and let us see what is the cost in lives and health. In 1902, the deaths were, in Philadelphia, 2,845, or 11.9 per cent.; New York State, 12.1 per cent.; total death rate, 10,763; Greater New York city, 13 per cent., 8,883; Chicago, 2,495, 9.4 per cent; Illinois, 3,331, 9.3 per cent.; San Francisco, 1,049, 16 per cent.; Albany, 219, 13.4 per cent.; ten principal cities of the United States, 18,763, or 10.8 per cent.; 1,563 towns, total 41,404, percentage 10.9.

Now let us take a comparison with other diseases: In Chicago, diphtheria, four to one; scarlet fever, seven to one; typhoid fever, seven to one; one and two-thirds times combined diphtheria, scarlet fever, typhoid fever, smallpox, measles and meningitis. Ten principal cities, 18,763 to 12,261 for typhoid, scarlet fever, diphtheria, measles and whooping cough; 1.58 per cent. to 1 per cent. for smallpox, typhoid fever, measles, scarlet fever, diphtheria and whooping cough combined. I have here a list of the percentages in the different States, but I will not take the time to read them.

What is the cost in money? Acording to Vaughan, one-sixtieth of people have tuberculosis. One and one-quarter millions, figuring the cost at $1.15 a day, is seven hundred millions a year—equal to the total agricultural exports. One billion would be more accurate. One hundred and fifty thousand die each year of tuberculosis. Estimating each life worth $5,000—which is the legal value that can be recovered in damage suits in many States—you have $750,000,000 a year. It is even worse than this. Kohler at Stuttgart says of all people who die between 15 and 60, one-third die of tuberculosis. Bertillon says that of 1,000 deaths due to tuberculosis, they may be divided as to time of death as follows:

1 to 20 years	184
20 to 40 years	448
40 to 60 years	313
60 years and over	55
20 to 60 years	76.1 per cent.

Now let us see what this means. Prior to 20 years of age the child is dependent upon its parents or upon some legal guardian. After sixty years of age, the man again becomes dependent as a general proposition; dependent either upon his family or upon the State or upon the savings of earlier years of greater activity. Therefore I divide the community into two classes: one class who are living from the bounty of the land, and the other class to represent people that carry the burdens of the country. In these years the men are rearing families, the women are rearing families, and the expense and responsibility of family life is upon them. In these years the great resources of the land are built up. These are the people who make for prosperity. These are the people who make for everything in a material way in a community. Of these earners, of these workers, of these responsibility carriers, one-third who die, die of this disease.

I think that probably you are aware that the conditions are bad, but bad as they are they are in no sense irremediable. We have wiped from the face of the earth, you might say, yellow fever, smallpox and scarlet fever, and the problems that these diseases presented were in no wise greater or more intricate or more difficult of solution than is the problem of tuberculosis. We have had to deal with a very similar disease. At one time leprosy was spread throughout Europe perhaps as extensively as tuberculosis is at the present time. We have wiped leprosy, practically speaking, from the face of the earth. Such effort can equally as easily and as certainly eradicate tuberculosis.

How can this be done? As I said in the beginning of what I had to say, the great item now is education. The people must be educated and the natural educators of the people are the physicians and the natural educators of the physicians are the health officers of the respective communities. You have, gentlemen, a power that you little dream of. You heard what Dr. Fulton told us last evening, that the people cared not for general prophylactic principles. They must be brought home in some way to these people. I say to you there is no household in the State to whom the question of tuberculosis can not be brought home as a family matter, for there is no household in the State of New York that has not at some point or other, through immediate relatives or friends, been brought in contact with this disease.

Radiating from you as a center, health officers of the villages, of the counties, of the municipalities of the State of New York, the physicians of the State can be educated to the importance of this question and the means of remedying it. These physicians in turn become new centers for education to the end that the communities may be educated, and the education of the communities will mark the deathknell of tuberculosis. Public action, as you are aware, is slower than public intelligence, but is sure to follow.

It is your duty, gentlemen of the State of New York, to begin this cultivation of public intelligence in these communities, to the end that the public sense should be aroused over this, that public action may ensue. [Great applause.]

Commissioner Lewis—The paper of Dr. Evans is before you for discussion. We expected Dr. Ward to discuss the paper. Is Dr. Ward present? (No answer.) Any other gentlemen?

Dr. Green (of Buffalo)—The matter, of course, is one of vital interest to us all, especially who live outside the city of New York, and the matter that struck me most was the value of education, which, it seems to me, is also of vital interest to us. Speaking of the city of Buffalo, I wish to give great credit to the physicians there who are very willing and are anxious that all of these cases should be registered. The city of Buffalo has a system of registration and the physicians report the cases to us. The bacteriological department of the health department examines the sputum in all cases and a report is sent to the physician or to the family, as the physician, the attending physician, may suggest. We have printed slips which, as I say, are mailed to the attending physician and he gives them to the family, or mailed direct to the family, either one or the other, giving directions as to how to take care of the sputum and what precautions to take to prevent the spread of the disease. In that way we are expected to know just about how many cases we have in the city and how they are taken care of.

Another point, which was of special interest I thought, and in which I agree most fully with the author of the paper, is being candid with the patient. I believe that the patient should always know if he has the disease, and that he should also be told about in what stage the disease is and if he has a living chance if he goes away from his environments to recover. There are many men living to-day, many persons who would have died if they had not been told what should be done and given minute instructions. In the case of the State of New York, in the sanitarium which is to be built and is being built in the Adirondacks, I think a great deal of good will be done by that institution under the direction of the Department of Health. I was somewhat surprised to hear the Doctor say the Department of Health of Chicago does not examine sputum, or make reports to physicians as they may desire to ascertain whether a disease is tuberculosis or not. It seems to me that is of vital import and one thing that can not be overlooked.

Dr. Frederick C. Curtis (of Albany)—Mr. Chairman, I think I ought to say something, because you put me on the list.

It seems to me that this problem is the greatest one in infectious diseases and one which was abundantly worthy of all it cost in Dr. Evans's time and effort to come here and read his paper, which contains all that can be said on the subject, which embodies what, it seems to me, is true in all respects—not only in its emphatic statement and picturesque deliniation of the distribution and enormity of this disease, not only his thought in the restraint of people, but I was pleased to note what he said about the relationship of bovine tuberculosis.

When three years ago Koch promulgated his doctrine of disbelief of the relationship of tuberculosis in cattle to the human being, it at once aroused a great deal outcry and has been followed by a great deal of hard study. I can not but feel that my sympathies personally were with Koch in the position he took. Now last month, the three years having elapsed, the International Congress of Health met again, and naturally there came up before it a fresh discussion, and a very heated one, in Brussels, on this subject which Koch had outlined and projected into the hygienic world three years ago. There was much said on both sides of the question, but I was interested in the conclusion of the whole matter, which was the expression of the opinion of the Congress to the effect in the main that tuberculosis is chiefly of human communicability, but that efforts should still be continued and not relinquished of taking those steps which have been used for many years now in controlling the product of bovine. I have a copy here of the resolution: "That human tuberculosis is specifically transmitted from man to man. Nevertheless, in the present status of our knowledge, the Congress is of the opinion that there still needs to be precautionary measures maintained against possible infection by animals." And that, I fancy, is the average opinion of the sanitary investigators about it, very well expressed in that.

Now the meaning of this is, to my mind, that it is not wise to throw dust in the air; it is not wise to shut our eyes to the danger of the communicability of the disease from the person affected with it, the human being who has the disease. There is the chief medium for distribution; there is where we have to guard especially. I know that often in emphasizing it we are, perhaps, adding to the feeling that has taken too much hold of the human mind in this country, and perhaps generally, which is a sort of a phobia, that a consumptive is not allowed to be taken at hotels, especially summer hotels, and in a great many ways his liberty is curtailed, simply because perhaps of overfear of such an individual on the part of the people in general.

I would not inflame the public mind in regard to this; still the truth is nevertheless clear. I am confident that the sputum especially of the consumptive individual, is the medium for the transmission of tuberculosis disease.

Now as to the details of the disposal of the sputum, where clearly and plainly the control of this disease lies. We need constant reiteration of just such statements as Dr. Evans has put before us this morning. Clearly and explicitly the details of how to reach them, how to treat the bedridden consumptive. There is an individual easily controlled. You need other ways to treat the non-bedridden consumptive. Now Dr. Baldwin read us a paper last year, one which was exceedingly temperate and good. All these things depend on further study of the life and methods of the tuberculosis germ, of the tuberculosis bacillus outside of the body, if it has any prolonged life at all outside of the body, what its habits are, how it reaches the susceptible individual from the one who has the disease, how much should the liberty of that individual be curtailed, and how in various ways we can control and reach this germ.

I believe the physicians—primarily the health officers—are to be not only school masters, as Dr. Evans says, for the people to give them right instructions, but to find tuberculosis in the individual at the earliest moment, as emphasized in a paper by Dr. Trudo; we must at the earliest moment reach it and control it. Have not many been infected with this disease from sputa on blankets in sleeping cars and hotels? How many, I wonder, contract the disease in such a way as that? Take away, if you can, the selfishness of human nature—and every man here knows that is the predominating thing and hard to combat. When they have an infectious disease in their family or personally, they care comparatively little for the rest of the community; that is true of most people, that has been my observation. To get into the individual's mind that he is a dangerous element, and some moral sense along with some instruction, and in some way or other control that output of his which is spreading broadcast this disease. Every year thirteen thousand people die in this State of consumption. It exceeds the mortality of all the other infectious diseases together, if you exclude the diarrheal diseases, and the subject is only still a problem in many ways. I have no question of doubt but what along well known lines we all of us can bring to bear our influence in the ways Dr. Evans has suggested to shorten and curtail the disease. [Great applause.]

Commissioner Lewis—The Conference will be pleased to hear Dr. Fulton.

Dr. Fulton—Mr. Chairman, the paper which we have heard, and which was a very inspiring one, seems to be in the idea of education of the public. Education, that is education of the people, seems to be the best means, though as Dr. Curtis, who has just been talking to us, has said, too many intemperate things are said; as members of the profession are getting better acquainted with tuberculosis this is steadily decreasing at the present time and we seem to be getting the best of that situation. But I must say, Mr. Chairman, that this matter of phthisaphobia does not disturb me very much, because it seems to me a perfectly natural phase in the evolution of the tuberculosis problem. Every medical student goes through fifteen or twenty sorts of phobias in the course of his study. That is part of it as he works up. And so it is with the general public. The profession is fast getting through with that phase at the present time and the public is not far behind.

It would be a great thing for us if the men who address the public on these subjects were as eloquent as Dr. Evans, but we can not get men of that sort to talk to the people very often. The next best thing to do is to look for the principles and to make use of his most striking expressions on that subject.

Dr. Prior has said this: "We must learn to take care of the tuberculosis subject in the right way, at the right place and at the right time until he is well, instead of taking care of him. as we do now, in the wrong way, at the wrong place and at the wrong time until he is dead."

If, as I say, you have not the eloquence of Dr. Evans, to drum the dangers of tuberculosis into the ears of the people, you can use striking expressions of that sort so the public mind can be impressed by it.

We can also instruct the very ignorant people, the people who have no knowledge of hygiene as such, no concrete knowledge of the subject. Everybody knows the history of tuberculosis and the practice of isolation, for the practice has been followed at times for two or three hundred years. The good it did was rather perhaps counterbalanced by the amount of harm done by the increase of alarm felt for the disease. Now ignorant nurses take the sputum of tuberculosis patients and improperly dispose of it, and in many ways ignorance of proper precautions spreads this disease.

I don't think we can call this a new subject at all. It is a very old one. There are many phases of it that can be illustrated from the practice of ignorant people. In this matter, it seems to me, you should utilize your influence in instructing the public, for the human mind is the very best and the most important thing about it at all times. [Applause.]

Commissioner Lewis—Any further discussion?

Dr. Selkirk—The meeting is to be congratulated, in my view, upon the opportunity which it has had of listening to Dr. Evans, and his remarks, extended, eloquent and forceful, tell us things which we recognize as of the greatest importance.

Not only do ten to twelve per cent. of all deaths result from tuberculosis, but ignorance of the means which should be taken to prevent that disease has an effect upon ignorance in the prevention of other diseases. I think it speaks well for the movement which is on foot to extend the knowledge of hygiene, that there are so many men who are speaking for the suppression of tuberculosis. Dr. Evans is one of the best known and there are others who can speak forcefully, at length and authoritatively. There is no more interesting subject to a man of energy. It would seem that the most effective work in hygiene is being done by such men and at such meetings as we have here now. The universities don't teach hygiene. The colleges don't teach hygiene. I speak of them for the most part, although you can find a chair of hygiene or a laboratory in hygiene at some few. A character of knowledge of the prophylactic measures which should be followed for the prevention of tuberculosis in every household—that is the dream of Dr. Evans—will be followed by a knowledge of hygiene there which will prevent other diseases.

I said I believed almost every word that Dr. Evans had spoken. There is one which dropped I think inadvertently by way of illustration, which I don't share his opinion on. That is with regard to the suppression of malarial fever and the effectiveness of the measure he cited to prevent the hatching of mosquitoes.

I think it is not desirable for me at least to advise against any measure for the prevention of disease, and I would not ask you to give your sole attention to the malarial patient or the mosquito alone, but contrary to what may be Dr. Evans's view, the work for the prevention of mosquitoes has been very effective in the prevention of malarial fever. I am not referring to the so-called extermination of the mosquito which has been practiced by people who have had no practical experience in any work, but who have been greatly advertised. Now it is practically impossible to exterminate the mosquito anywhere, but you can greatly reduce their numbers if you use the right means. The right means are not such temporary measures, such temporary makeshifts as have been most widely advertised, kerosene oil. To secure good work in the elimination of malaria and mosquitoes, you have to do it on the lines of civil engineering, the digging of trenches on lands, the raising of the elevation of low-lying properties. When that work is done you will have many less mosquitoes, you will have much less malaria. It doesn't need the mosquito theory to show the usefulness of that work to the public health. The two results will come together—you will get a reduction in your malaria, and you will get a reduction in the number of mosquitoes. An opportunity may be given someone later on in this meeting to speak more at length on the value of this work. I have had a great deal of experience in it, and I think that I should not like the gentlemen of this convention to carry away the impression to pay no attention to anything but the malarial patient if you want to get rid of malaria. [Applause.]

Commissioner Lewis—I notice Dr. Macdonald, of the commission for the erection of the Tuberculosis Hospital, is present and growing impatient at being so long repressed. If Dr. Macdonald will step up here and explain to us and describe to us the sanitarium now nearly completed, the conference will be very happy to hear him. [Applause.]

THE PRESENT STATUS OF THE NEW YORK STATE HOSPITAL FOR THE TREATMENT OF INCIPIENT PULMONARY TUBERCULOSIS

BY WILLIS G. MACDONALD, M. D., OF THE BOARD OF TRUSTEES

MR. PRESIDENT AND GENTLEMEN—It is true I am present, but it is not true I am impatient, and I want to say to you I have enjoyed every moment of this discussion, and feel that I have been greatly instructed by it, and should be glad to listen further and at length with relation to it, and feel that it would be of far greater interest and far greater importance than the paper which I shall present.

As a preliminary to the presentation of a description of the plans I have prepared, a general statement of fact with relation to the organization of the first general hospital for the treatment of incipient tuberculosis under the direct care of the State of New

York requires some particular consideration. The State had within recent years assumed the general care of the insane, the epileptic, the mentally defective and the crippled. The organization of so large a benevolent system has compelled a large expenditure of money, having chiefly at that time its main source in the direct taxation of the people. With an annual expenditure of over twenty millions of dollars each year for the support of the State, additional outlay in any direction demanded the closest scrutiny upon the part of those charged by the State with the management of its expenditures. The very considerable charges to the State by the Lunacy Commission—a source of long-existing misunderstanding as to probable and actual expense to the State—led immediately to a conservatism upon the part of legislators in entering upon the care of patients suffering from tuberculosis at any stage. Not unmindful of the necessities of the tubercular, but questioning the propriety of the State assuming so large a burden as the treatment of all its incipient tubercular citizens, they demanded, very reasonably, an accurate estimate of the probable annual per capita expense to the State, and the number of patients likely to require its bounty. Further, the evidence offered to the Legislature of the permanency of the salutary effects of sanatorium treatment was insufficient to command the undivided confidence of the Legislature.

The present hospital, in accord with the views of the Legislature, contemplates upon the part of the State an experimental institution designed to established a number of primary, yet important, facts.

First. The building of a suitable type of hospital affording every known advantage for the treatment of the tuberculous patient upon the most economic basis, involving adequate administration and medical care, together with suitable heating, lighting, plumbing and ventilation systems, provision for a suitable dietary equipment, and a laundry and sterilization plant fulfilling the modern hygienic requirements; and in addition, the solution of the questions of an unpollutable water supply and a satisfactory sewage disposal.

The entire problem to be considered as a symmetrical whole presents many elements inviting exhaustive study, and frequently these are associated with sources of interminable delay in the construction of hospitals. Fortunately, after the selection of a site, to which I readily plead guilty as a member of a strenuous and unconvinced minority, no difference of opinion within the members of the board of managers has existed. Each member has given his best personal endeavor in the achievement of the primary purposes of the institution as measured by the necessities of the State.

The plan of construction presented to you marks a distinctive departure from some well recognized ideals of construction, as shown in the Cottage Sanitaria of America and the "Barrack System" of our German confréres, and may awaken your immediate criticism. A better understanding of the peculiar rigors of the Adirondack climate, and the problem of economical heating and service, will demonstrate the peculiar advantages of our system of construction.

While concentration of separate buildings is a distinctive feature of our construction, yet the preservation of the desirable features of the cottage plan are maintained through the practically isolated system of pavilions established.

For the economics in administration, heating and lighting, a pavilion unit of twenty-seven patients is assumed, rather than a cottage unit of ten or twelve. At the same time the allotted open air floor space, as measured by open veranda, is not curtailed. Measured by the highest immobility of patients, the open air veranda of each pavilion affords abundant opportunity to place every bed and its occupant in the free air and sunshine every day. Aside from the ample provision made for direct open air treatment of patients as a part of each pavilion, provision is also made for a less rigorous system in the sun-parlors arranged in the connecting corridors of the hospital. These corridors, of ample proportions, with every modern facility for ventilation supplemented by large open fireplaces, with open window spaces which substantially counterfeit the peculiar advantages for heat and ventilation of the "lean-to" and open fire of the woodsman, are presented with sufficient floor space for all.

With a background of roaring logs, with feet warmed by tubes filled with live steam, and body well protected with thick wool, the tubercular ward of the State may face through open window the health-giving blasts of the Adirondack winter. Aside from the peculiar advantages afforded by both the open air and partially inclosed solaria provided for each pavilion, a larger solarium, comprising the entire third floor of the administration building, is provided. This division, practically in the open air, through glass and sash, is given to an amusement hall with Adirondack finish in wood. It affords, under painstaking medical supervision, lighter gymnastics, as billiards, handball and squash tennis—at least the milder of these exercises for convalescent patients.

The modern Adirondack treatment of tuberculosis presents many of the features of an extended rest cure and implies little physical exertion. While in agreement with the plan, especially during the first months of treatment when lung rest is parallel with the well recognized necessity for joint rest in active tubercular process, when, however, the process becomes stationary, or has assumed the pathologically passive condition of damage done, I can see no reason why, during convalescence, patients should not take, under appropriate medical supervision, such physical exercise as appears conducive to their return to active life and its responsibilities. I appreciate that no very definite period for the beginning of such exercises can be established, and must be established by the conclusions based on special clinical observation in individual cases, but usually not during the first six months stay in the hospital. However attractive, I find myself drifting from my original plan of description of the hospital, yet policy is so inevitably interwoven with plan in hospital construction, that occasional allusion is indispensable.

The site of the New York State Hospital for Incipient Tuberculosis is located at Ray Brook, town of North Elba, in Essex county. Its immediate exposure is to the south and east on the side of a well wooded mountain, and its immediate elevation above sea level is 1,639 feet at the base of construction. The view from the veranda of the hospital is comprehensive and agreeable. The winding of Ray Brook through a level field and its expansion into the wider Ames Pond furnishes at once an agreeable foreground to a more admirable landscape of infinite variety. To the far right, Ampersand and White Face mountains are limned in the horizon; traced to the left lies succeeding lesser heights with wooded summit or animate pasture, until in the far distance at the left is marked, in a lazy haze, Mount Marcy, the highest point of the Adirondack wilderness, presenting from the solaria of the hospital every feature for an idle day-dream, undisturbed by the turmoil of human activity. Here, in the pure Adirondack air, care free and surrounded by placid but diversified scene, may the ward of the State forget his immediate ills, and sleep, and grow fat, while the primary pulmonary lesions encapsulate, degenerate and become negative as a menace to his wellbeing.

The soil of this locality is peculiarly adapted to the demands, being largely of light clean sand and gravel. Porous, it easily affords a natural drainage, and assures a hygienic condition uninfluenced by ground waters. An ideal water supply is afforded by Little Ray Brook, free from all pollution and situated upon State land. Sewage disposal is made an easy proposition on account of the character of the ground, yet is safeguarded by a complete modern system.

The general ground plan shows a sub-basement of sufficient height, which affords room for the large conducting pipes for heat, water and light, and relieves the succeeding stories of these unsightly encumbrances. The floor is concrete, with ample provision for drainage. There is ample space for ventilation, excluding the question of ground air and moisture.

The base areas of the several buildings are as follows: Administration building proper, 4,960 square feet; auxilliary buildings, including kitchen and cold storage, 2,208 square feet; boiler and dynamo rooms, with coal pockets, 2,520 square feet. The base area of each pavilion, including solaria, is 6,464 square feet. or 12,928 square feet for both, or for all four apartments, 25,856 square feet. The connecting corridors and adjunct solaria have each a base area of 2,480 square feet, or all of 9,920 square feet, presenting a total base area of 45,464 square feet. Again considered separately, a floor area of 18,600 square feet is occupied by administration and service, including quarters for all officers and servants, and a general dining-room for patients, 3,224 square feet. The sleeping apartments for patients present a floor area of 19,136 square feet, and the various solaria a total area of 14,064 square feet, presenting a grand total of 29,648 square feet devoted to the welfare of patients, or based upon the provision of the law, it affords 190 square feet for sleeping apartments for each patient, and 140 square feet for solaria or recreation space. Measured by the most liberal hygienic standards of building, it will be noted that ample space is afforded each patient.

Your attention is called to the general plan of the first story of the buildings entirely above ground.

Taking into consideration, first, the administration building, a large general dining-hall presents, capable of seating one hundred and fifty persons at once without overcrowding. It is immediately contiguous to the service kitchen, and presents every facility for the satisfactory and economic service of food. The servants' dining-room is immediately adjacent to the left in the connecting corridor, from which food for the officers' dining-room above is conveyed by dumb waiter. To the left, a portion of the laundry, sterilizing and ironing room presents, with suitable storage.

The first story of each pavilion furnishes respectively quarters for the servants of the institution, and provides for complete segregation of sex. Apartments and general social rooms are provided, together with abundant lavatory facilities. A portion of this space is also reserved for increased storage facilities. The further features of this floor plan are sufficiently illustrated by the accompanying drawing.

The plan of the second story of the combined building is comprehensive. In the administration building, the entire floor is devoted to the various departments of administration, with offices, examining rooms, clinical laboratory, postoffice and reception room and library. This center of administration is reached by each connecting corridor, by the elevator, and by a porte-cochère not shown in the drawing. A little study will show the advantageous concentration of this department. The well-equipped laboratory is provided with a retort for the incineration of sputa under the direction of a skilled assistant physician.

Continuing through automatic closing doors to the right or left. we enter spacious, yet partially enclosed corridors, fitted as solaria, adapted to the inclement weather of an Adirondack winter. Each solaria has an open fireplace designed for a fire-log. besides an abundant indirect supply of heat and steam coils arranged near the floor, affording a comfortable warmth in the severest weather with an adequate ventilation. Beyond, on either side, lie the quarters for patients, each presenting a unit of twenty-seven. The apartments are divided into individual rooms and small wards for three or four patients. The individual rooms are sufficient in number to accommodate the new patients and those presenting the more acute evidences of disease. Under satisfactory conditions, such patients will be removed as their symptoms abate to the small wards, and finally to tents and open-air pavilions of temporary construction, to be described later.

All the apartments based upon a unity of twenty-seven are practically identical, and embrace practically identical features save such modifications as are demanded by sex—namely, individual—lavatory compartments for women, and other opportunities for privacy for females. These apartments are four in number, two male and two female, each in a separate pavilion, providing for the necessary segregation of sex.

It will be noticed that the plumbing of each apartment is confined to a definite section of each pavilion and affords to each patient every facility demanded by hygiene, combined with economic construction. In the female apartments, separate booths give a satisfactory privacy for the completion of the toilet. Such an arrangement affords great economy, simplicity in construction, and also eliminates many sources of air contamination. The plan is supplemented by ordinary portable conveniences in each room, to be used only during acute illness. Each apartment also contemplates quarters for a specially trained attendant—a trained nurse with special instruction in the care of the tubercular, with a duty room for clinical charts, medicine, general supervision and dietary cooking. This trained attendant is also charged with linen and other supplies of the apartment, and becomes responsible for the general discipline, cleanliness, and other conditions of the entire corridor under her immediate supervision. The selection of these attendants requires great painstaking, and requires much besides mere time serving for salary to achieve the best results.

The division of individual room and small ward has been a source of much study. Every effort has been made in the direction of the isolation of each new patient until the essential features of the case are made clear. Patients occupying individual rooms are to be regarded as acutely ill. Improvement and convalescence involves transfer to the small wards, and apparent cure, to the outdoor-tent settlement—a progressive system, calculated to arouse hope in the patient with every transfer.

Little remains of essential interest in the description of the present hospital. The third floor of the administration building is given over to satisfactory residential quarters for the medical superintendent and his medical assistants, with sufficient installation affording private dining-rooms and lavatories, in every way desirable and efficient.

The fourth floor of the administration building furnishes agreeable quarters for the entire nursing or nonprofessional attendants force of the hospital in a division by itself. Besides, it presents a large assembly hall, reached by elevator without fatigue, where all the patients may enjoy occasional entertainment by amateur companies, or find a general assembly room for cards, billiards, or similar amusement. This large amusement hall, having a floor area of 3,250 square feet, is provided with an abundant sash exposure and affords an auxiliary sun-room with an abundant space. It also affords opportunity for the care during severe weather of tent or temporary pavilion patients.

The law establishing this hospital contemplates an institution with a hundred beds. The board of trustees have striven to build within the limits of the law and yet maintain the highest ideals of hygienic construction.

As the institution develops in its construction, it has been found that it presents great internal possibilities for expansion without additional expense to the State, and with a supplementary development of open tents or barracks at a small expense the capacity of the hospital may be multiplied.

I trust with the assistance of the plans presented to you that a comprehensive understanding of the institution is made possible. It has been the aim, first of all, to construct a model institution, measured by the greatest benefits secured by inmates and the highest economics in construction and subsequent maintenance by the State, both problems of infinite study. Measured by a comparative study, this State institution presents a comparative cost per capita of less than one-half in the department of construction and still attains every essential feature in treatment. Equal, even greater, in capacity than the Adirondack Sanitarium, it presents an initial cost at least half less per capita, and with equally desirable facilities for treatment. It is needless to refer in detail to the extravagances of similar institutions in the Adirondacks which have afforded little for imitation in the organization of the Ray Brook Hospital.

Time alone, the arbiter of all, must establish our position. Whatever may be our results of treatment, it will be made definitely known at stated intervals with the most painstaking particularity. No report will bear the hall mark of a special pleading, but of a general consideration and summary of absolute work done. Our duty is exacting and far reaching, the responsibility is great, compelling an intimate relation to every department of the institution. It becomes our anxiety rather than our immediate hope to so account for our management that we may convince the authorities of the State of the practicability of our efforts.

No academic effort will satisfy. Integral demonstration in multiplied instance is demanded. We feel that under the imposed conditions already nominated by the State, we are in a position to fulfill every condition of the bond and more. The diligence of the board of managers is measured by their capacity to enforce the completion of contract work. They are now collecting a daily penalty from the primary contractor, with the hope that he may complete his contract at an early date and avoid further penalty.

Every effort has been made to secure quarters completed for the reception of patients by the first of January, 1904. Delays, however, through dilatory contractors and their inability to secure building material, will undoubtedly further postpone for a brief time the final inauguration of the hospital. The administration and auxiliary buildings, as well as the connecting corridors, are now inclosed and in process of final finish. When completed, a limited number of patients may be immediately received, before the completion of the pavilions primarily designed for patients.

From this point I think it would be well to take up the explanation of this subject from the drawings which have been loaned me by the State Architect. These drawings represent, perhaps, the fifteenth plan or more which has been drawn.

(Dr. Macdonald then came down on the floor and explained the plans, which were suspended from in front of the speaker's desk.)

This statement here, "Basement floor plan," that is really the first floor plan. All of this (indicating) is absolutely above ground. The portion I have attempted to describe to you that lies underneath this is the sub-basement; that will practically allow a man to walk standing erect. This basement is laid with stone, has a cement floor, contains all the piping, the large conducting pipes for the heating system and light of the entire system of buildings. This shows the general type of the outlines of the building (indicating).

I might say, first of all, that this portion up to there, around here (indicating), is now completed in its construction, so far as that the roof is on and all the floors are laid and a portion of the plastering is now done. That is this entire portion here (indicating). Now this floor is intended, first of all, for the main dining-room, which represents the first floor of the administrative building (indicating). This room here (indicating) presents an area of 3,224 square feet, 62 by 52 feet, and is directly in connection with the kitchen, which occupies this side here (indicating). Here is the kitchen, and the bakery here (indicating) and a large refrigerator (indicating), and that (indicating) affords immediate communication. So that all of the food of the patients and help, outside of the officers, and the dining-room, is all confined to this section of the building. Just here we have the boiler room with the coal pockets, and the laundry and ironing room and the sterilizing room (indicating).

On this side here (indicating) we have a full length pavilion, which provides, first of all, comfortable quarters for all the female employees of the institution outside of nurses. That is an important problem in the Adirondacks. We are three and a half miles, practically, from any association and it is a very difficult thing to secure domestic help unless you provide some very agreeable quarters for them like here provided. That also provides quarters for the matron who has general charge of this building.

Now the same things as to the second main pavilion. That provides suitable quarters and smoking room for the male help.

That presents the general plan of the first floor of the hospital (indicating). This dining-room may be entered from stairs or from elevator, or the patients may come from the pavilion and enter through here (indicating), or through this porch here (indicating). It has abundant capacity. It will be recollected this hospital was built to accommodate only 100 patients. This dining-room has abundant capacity for seating 160 to 200 people.

SECOND PLAN

This plan (indicating) shows the next floor here. This is only one story high (indicating), and here are the upper storerooms and rooms for the steward and bookkeeper, who has charge of the supplies of the institution (indicating). At this side, just across from the main corridor, is a laboratory (indicating) of some considerable proportions, containing the usual facilities in the way of microscopes, etc., and right here directly connected with the laboratory is the crematory (indicating) for the cremation of the sputa. I can't quite agree with Dr. Evans in his statement of the expense of paper sputa cups. You can get paraffin paper sputa cups six for a cent outside of the little metal frame in which they are placed. So I think we have come to the decision to use paraffin paper sputa cups. This portion here (indicating) is given over to the general officers, reception rooms for the institution, the examining rooms for patients, dark room and such other accessories as are required.

On the other side from this point here (indicating) it is closed by doors which are locked at night. We have separate pavilions and solaria. In the first place these are types, they are all practically alike. In the first place these rooms here, these pavilions, this first floor here (indicating) present quarters for 28 patients, half of them in private rooms—that is, each patient has a room by himself. This room has a capacity of about 1,800 cubic feet, very close to it. Then a certain number of rooms are provided as dormitories, where three patients may be maintained. Now there is no water connection with any of these rooms, none at all. We wiped that out of our plan and have placed here an abundant water connection and toilet, just at this point here (indicating). On the female side we have arranged it with a partition half up to the ceiling which protects them and gives them privacy in performing their toilet.

Now in the first place this building is 132 feet long and is 46 feet wide. This portion of it, extending along each side of the building (indicating), is an open air space 74 feet long and 14 feet wide, covered like the deck of a ship with canvas. It is bounded so that it lies on the west and the east is exposed to all of the elements. This frame is arranged to run up along in such a way that in the winter time that can be sashed in; there is no heat supply there whatever. This space at the end of each pavilion with the open corridor is arranged so that beds may be placed on bed trucks and rolled directly out. Forty square feet is provided for each patient. The average bed covers 18 square feet, a single bed. This provides sufficient room for their separation, and practically sufficient sun room for them and outdoor space.

Now we have besides that this very considerable room here (indicating). This is 44 by 40 feet and contains 1,760 square feet, and if these two (indicating) are added to it, 720 feet more.

This also (indicating) is largely provided with glass for the protection of the more feeble patients. At this point here it will be observed there is a large fireplace (indicating). At different points, there and there and here and here (indicating), are arrangements for indirect ventilation of the most abundant quality.

Now besides this arrangement of solaria, we have here the nurse's duty room (indicating). That is the person who is to have ministerial charge of these wards and a person who will receive, if she doesn't already possess it, direct knowledge in managing especially the hygiene of these patients. It will be her business to instruct them in the care of the sputa cups. It will be her business to examine into the character of the laundry which comes from these pavilions; it will be her business to see that these sputa cups and cloths are delivered at stated intervals at the crematory for destruction; and besides that she will have general supervision over the behavior of the patients.

Now right here at this point (indicating) are doors which can be closed and are expected at a given hour at night to be closed in such a way that it will be impossible for patients, the male patients, to get outside the pavilion, and the converse will be true. That has been found to be a rather important matter in the sanitarium at Ray Brook.

THIRD PLAN

The second floor—really the third—is a duplicate. This is the top of the building and this is a type of the building (indicating). Here is room for 28 patients (indicating). This represents the outside, two for women and two for men (indicating). The solaria are of equal size. Here on this floor (indicating), 52 by 62, presents the quarters of the superintendent; that gives him a private dining-room, and provides three bedrooms, a parlor and a library. Back here (indicating) we have the quarters for the assistant physicians, bedrooms, reception room, and for certain other persons, regular help in the hospital. That represents the type of that (indicating).

FOURTH PLAN

This, here, is part of the sub-basement, showing with relation to the high-pressure boilers and dynamos (indicating). The building is lighted entirely by electricity and the elevator is run by electricity, and the electrical machinery is located just at that point (indicating). This elevator goes up directly to what is really the fourth floor, or the top of the administrative building, and here (indicating) we have arranged for an immense room, a room 52 by 62; it simply is supported by columns. Back of that corridor are arranged rooms and quarters for the trained nurses and assistants. This large room here (indicating) is now to be given over as an amusement hall where amateur entertainments may be given these patients, where they can have simple amusements, where card playing and things of that kind can be conducted.

FIFTH PLAN

Now we have here a plan which shows the general plan of the building. In good weather, every day in the year at 9.30 o'clock in the morning, the sun will strike every window on the front of this building and continue to strike some portion of the windows until 3.40 in the afternoon. That is a matter of survey.

This shows the general front of the hospital (indicating).

As I stated to you, this first contract is now approaching completion, and by the first day of January we hope to be able to receive a limited number of patients. I think at that time we will begin to be able to put this in effective operation.

Now as I have described it to you here, it must be apparent to you that the most abundant space has been provided here for the management of these patients. We not only have adequate sleeping quarters, well ventilated, but we have provided for outdoor quarters in such a way as to accommodate a great increase in the number of patients.

Now the entire cost of this system of buildings will not exceed $212,000. It now—the plan which I have shown you—presents a capacity for 108 patients, equal to that of the Trodo Sanitarium, which has cost half a million dollars all told. Now by classifying our patients somewhat we can practically multiply, without additional buildings, the capacity of this institution. In the first place, we shall classify our patients as those who present acute symptoms—fever, cough, expectoration. These patients on first entering the hospital will be given private rooms. As they progress toward recovery, if they are so fortunate, and the acute symptoms disappear, the fever disappears, then they will be put in the rooms of three. When the time comes when it seems they are approaching convalescence, when they begin taking exercise. when they must begin to prepare themselves again for the responsibilities of their work, then it is our proposition to take that principal amusement hall for the colder winter months for a large sleeping pavilion for the convalescents, and during the summer we will build a one-story open barracks of wood or partly wood and canvas, and keep these patients covered there. So that for nine months in the year—we have sufficient kitchen facilities. we have dining-room facilities—we can accommodate from 175 to 200 patients, and for the months of December, January, February and March, we can accommodate perhaps, by using this principal story as a sleeping ward for convalescents, 150 to 175 patients. [Applause.]

Chairman Johnson—The paper of Dr. Macdonald is now before you for discussion. Do any gentlemen desire to ask the Doctor any questions or discuss this subject?

Dr. Hix (of Binghamton)—I would like to ask Professor Macdonald what his opinion is in regard to these institutions, whether it would not be better for each municipality to care for their own incipient tuberculosis?

Now I believe that, in my own opinion I think it would be better, for every municipality to care for their own tuberculosis. Almost every municipality has near it or within its limits an elevation equal to this place designated by this commission. Some of the municipalities have in their neighborhood excellent accommodations for the treatment of this disease. Now near the municipality which I represent here we have an elevation of between fifteen and sixteen hundred feet. We have that elevation within the city limits, with the best of air and sunlight, except that Binghamton has more cloudy weather than the Adirondacks. Outside of that the sunlight would be equal to anything that has been described here, and my observation has been that patients can be treated near at home equally successfully with patients that are sent away to many of our health resorts. I have known of many that have been carted or taken away, some in the incipient stage, and I am sorry to say some in the advanced stage, to these health resorts, and but a very small per cent. have recovered their health. An equal per cent. which I know of, or have knowledge of, that have recovered by proper care, that is by a certain amount of proper care. I think there is where we are lacking—in teaching our patients and our physicians to take care of the tubercular patient at his home. I have, as I was about to remark, seen an equal number recover under these unfavorable circumstances in their own homes.

In this line, in connection with the other paper, I would like to emphasize one thing—that is, a real diagnosis. I do think in most municipalities the health department is negligent in furnishing facilities for a real diagnosis of this disease. Now I would like to hear from many of the health officers, and from the officers of the Department, in regard to the care of tubercular patients at their homes, or in the locality of the municipality.

Commissioner Lewis—Does any gentleman wish to discuss this question further? While you are getting ready, I would like to say—unfortunately I was obliged to go out of the conference during the discussion, but I would like to remind you what this Department does in regard to the examination of sputum. For two years now we have notified the health boards regularly throughout the State that we would examine any case of sputum in the laboratory that was submitted for a report. From the number of applications which we have received we infer that tuberculosis has practically ceased to exist in the State of New York. [Laughter.] The cases for taking the sputum, the cup. the boxes for mailing it, directions how to mail it, all the directions necessary are supplied to each health officer in the State. Of course, in cities like Binghamton, Buffalo and those places. where facilities exist at home, we don't expect to receive applications; but from the fourteen hundred other districts, where there are no local facilities for making this test, why don't you send it here if you want to make a real diagnosis? We are here for the purpose of serving the health boards of the State in that particular.

A Member—What would the expense be of sending it?

Commissioner Lewis—No expense whatever except a two cent stamp to put on the package when you send it.

A Member—I will send you some.

A Member—We have the examining done in the city of Buffalo. We can send it here if you desire it.

Commissioner Lewis—There is no objection to that, if you can get it done there.

A Member—I think it is not altogether the fault of the health officer, Mr. Commissioner, in not bringing to the Commissioner's office this sputum, or sending it here to make sure, to make a positive test that it is tuberculosis. The health officer is hampered by the attending physician in a majority of cases. It makes it pretty hard work for him to get this because the attending physician thinks the health officer is assuming part of his prerogatives as care-taker of his patient. That is one reason, I think, that so many fail to send the sputum for examination.

Commissioner Lewis—Yes, Doctor, but after a time the physicians will learn they are mistaken. We have had in the city of

New York the same experience for years, but the majority now whenever they have a doubtful case send the sputum to the health department laboratory.

A Member—If Dr. Townsend will come back in the country districts, he will find a certain jealousy among the physicians there that prevents them from doing that, from furnishing these means.

But speaking on the line of health resorts for the cure of tuberculosis, I have seen a great many in different sections of the country in places that are not suitable for sanitariums. The elevation may be proper, but still the air or the surroundings are not the proper ones, not the proper environments for a perfect cure, for a perfect cure of the sick tubercular patient. We ought to send out patients to the highest point in Colorado, New Mexico or Wyoming for the simple reason that the air there contains less moisture than it does here, and the healing of the diseased surfaces takes place quicker there than it does here for the simple reason the air is drier. It has been my practical experience in those sections that men with tubercular trouble live and enjoy comparatively good health and do severe manual labor, where when they come down in the lower altitudes, lower altitudes containing moisture, they were almost unable to live. I spent four years in Wyoming and I came in contact with probably four or five hundred tubercular patients in that time, and I found men there who were doing the severest kinds of manual labor the year round that were unable to exist any length of time in the lower altitudes. I think that has a great deal to do with locating our sanitariums at our homes, it is not only a choice of elevation, it is these atmospheric conditions we ought to take into consideration.

Commissioner Lewis—I am very much impressed myself by the suggestions of the Doctor with regard to two classes of sanitariums, one for incipient cases and one for infectious or advanced cases. I have always contended we ought to have sanitarii for advanced cases in combating the spread of tuberculosis, and

I am not certain that I have changed my views. If we had institutions where infectious cases could be taken, then we could put these cases where they would be taken care of and the infecting stopped from these patients, and that would remove a very large part of the risk from tuberculosis in these large cities. New York city should have, in my judgment, a place for its incurables and a place for the treatment of incipient cases.

A Member—I would like to have Dr. Macdonald speak on the question of what class of patients are to be received in this hospital, what test is to be used, whether the patients are to be taken there as to a charitable institution or are to pay.

Commissioner Lewis—I am not sure Dr. Macdonald is ready to answer that question, as to the test for admission to this hospital when it is completed.

Dr. Macdonald—Mr. Chairman, I did not go into the discussion as to that to any great extent, because I felt I was trespassing on your valuable time, but rather described the technical building of the institution.

All of these problems which the Doctor has opened up, all these questions are ones of great moment. Now the law describes the patients that we are to receive, so far as the character of the illness is concerned, shall be patients suffering from incipient tuberculosis. It was the intention of the gentlemen who drew this law and secured its passage to provide for a class of patients favorable to treatment. While it is very difficult to say just what an incipient case of tuberculosis is, I believe it will be our duty, among our first duties, in sending out literature to the profession to furnish some liberal, decent definition of just what an incipient case of tuberculosis is, just what shall be the symptoms of the complaint, just what shall be the physical signs manifested. There are certain cases which practically from the beginning have very little hope of cure. Take cases in a family where there is a prolonged history back through generations of tuberculosis, where there is the tubercular shaped chest, etc., that patient is generally hopeless. We want patients whom there is some hope of curing.

I quite agree with you, Mr. President, in the statement that there should be two sorts of hospitals, and that a hospital for the treatment of patients who have pronounced evidences of the disease, evidence in which there is scarcely a hope for cure, the patients which present the greatest menace to the public health, these patients should be treated in hospitals, not in the Adirondacks. I do not believe, either, it is desirable to take very sick people to the Adirondacks as a rule. From what I have been able to see, and I have spent a good deal of time in the Adirondack region in the last five years, these patients do not do particularly well there. I believe it is desirable to keep these incurable cases here at home, in hospitals, just in the suburbs of New York or in our great cities, or in the neighborhood of Binghamton; but in earlier cases I think there are distinct advantages in getting them somewhat removed from their homes. If a poor man with a wife and three or four children is suffering from incipient tuberculosis and is put in a hospital where twice or three times a week the wife and the children are brought up to that ward, he has before him the hardships which they must suffer to a certain extent by the absence of the wage-earner, and it is going to be very difficult to keep that man in the hospital; just as soon as he is only a little better he wants to go out and earn his dollar and a half a day which is going to put bread and meat into the mouths of his children. If you get him removed to where the family relations, the family cares and sufferings, where that is out of his mind and out of his sight, he remains in a more peaceful mental attitude towards his cure, and he is likely to do much better. So I think, without going into this general question, that certain kinds of hospitals should be remote for that reason alone. I am not a great stickler as to just in what part of the State of New York a tuberculosis hospital is to be maintained. The success, however, of this institution as a hospital is largely going to depend upon you gentlemen and upon the profession in general. If you send us cases in the earlier stages of the disease our results will be much better. As soon as the doors of this hospital are open, if every case that is practicably incurable is sent to us our results are going to be bad. It is a very difficult thing for a public officer always to deny requests of other officers. There is sometimes a pleasant relationship which imposes upon an institution in a certain way, just as perhaps I might impose upon you, Mr. President, in relation to certain matters at your disposal.

These problems will present themselves, but we hope to take up the organization by the appointment of a suitable superintendent of this institution and we propose to present to the profession of the State of New York and the health officers of the State of New York a frank statement of the conditions and the methods by means of which patients may be brought into this institution.

First of all, the law provides a way for the practically free patients of the institution; second, any patients when we have room may be received there who are willing to pay a reasonable sum for a week's board; very much on the same basis as the patients who are sent to our State insane hospitals. First, free patients and patients provided for or paid for by municipalities; second, patients who pay a limited sum for their board and maintenance while they are in the institution. This sum for private patients will be fixed at the lowest amount possible. However, we must consider that the board can not allow patients able to pay for quarters to use up quarters provided by the State, which are nothing like sufficient for the number of patients which will present themselves. [Applause.]

Dr. Scott (of Kingston)—I would like to ask an opinion from this floor as to a matter of vital statistics, if there is no objection.

Commissioner Lewis—We are to have a short paper on vital statistics, Dr. Stewart.

Dr. Scott—I don't intend to take but a moment. Is it not desirable, would it not be advantageous to go to work and have a law enacted to secure the registration of births, deaths and marriages that occur away from home? I know a great number of cases occur of that kind away from home, get married, or people go away temporarily from home and die of natural or accidental deaths. I have seen a first of September when we had twenty cases in our little city of Kingston with 25,000. That would make about four a week or two hundred a year. By that ratio it would be fifty or sixty thousand in the State. Now to complete that work when a person dies away from home, the recorder of that should be obliged to make a duplicate and send it to the proper authorities where it belongs. I would like the opinion of the gentlemen here as to what they think about it. I think it could be done by enactment of the Legislature.

Dr. McKenna—I would like to have the opinion briefly of just one or two men like Dr. Macdonald or Dr. Evans, in regard to the allusion which has been made to tuberculin as a test in the early diagnoses of cases. I was just wondering if it was generally accepted as as good a test as Dr. Evans considered it.

Commissioner Lewis—The Chairman understood Dr. Evans to positively recommend it. I have a notion, based upon considerable observation, that it is not used to any extent whatsoever by the physicians of the State, even in the city of New York. If there are any gentlemen here who are familiar with its use, who have used it for that purpose, we should be very pleased to hear from them.

Dr. Macdonald—It is used generally in the Albany Hospital for diagnostic purposes in all cases of tuberculosis, surgical or medical, unless the case is absolutely clear, one beyond any question of doubt. Dr. Trodu in his sanitarium at Saranac Lake makes use of it in cases as confirmatory of the diagnosis, and it is used in certain of the incipient cases in which there are indefinite physical signs and in which there is no tuberculosis bacilli in the sputum.

Dr. McKenna—May I ask Dr. Macdonald a further question?

Commissioner Lewis—Certainly.

Dr. McKenna—If he can tell us very briefly—I know but little in regard to this, and I doubt if many of the physicians throughout the State do—if he could tell us very briefly, or refer us to literature where we might learn the technique of the use of tuberculin.

Dr. Macdonald—It is very simple. Koch's tuberculin is used as a medium. There is a preliminary dose of three or four milligrams. It is reduced so that a single drop represents a milligram; the three drops, that is a measured quantity. These drops are injected hypodermically. We give three to five milligrams at the first dose, taking the temperature two to four hours from this and at one or two hours' interval. The reaction usually occurs within the first twenty-four hours; if it does not, the dose is repeated and we give as much as six milligrams. It is necessary to use carbolic acid in solution or saturate the water with a solution of chlorin in order to preserve this. We usually make up a quantity of it and we keep it in the ice box.

Commissioner Lewis—Two questions have been handed in.

"A water company supplying a village with water and their reservoirs are situated in the town beyond the limits of the village. Which board, the village or the town, has sanitary supervision and control over the reservoirs and watershed supplying the water?"

The law provides that rules and regulations for the protection of a watershed may be established by the State Department of Health, the enforcement of which rules may be secured through the people or any person using the water, any municipality or board of health from the municipality which uses the water. When it comes to securing the enforcement of the rule outside of the municipality using the supply, the procedure is to make an investigation and report that such and such a rule is being disregarded. If it is found to be so, that report is sent to the State Department at Albany, which also verifies the fact that such rule is not being observed. Then notice is to be given to the board of health of the town in which the nuisance or infraction occurs. Of course there is a local board of health covering every foot of the territory. That board of health is then requested to see that this rule is enforced.

Dr. Peck—Who makes the first complaint to the board of health?

Commissioner Lewis—Anyone using the water of the water company in the village, the trustees, or any other person.

Dr. Peck—To which board do they make it?

Commissioner Lewis—The local board of health in the village.

Dr. Peck—Then, as I understand it, the village board of health has control outside of their jurisdiction?

Commissioner Lewis—To the extent of making an inspection and preferring a complaint.

Dr. Peck—Supposing there is no complaint, but that it is known it exists——

Commissioner Lewis—I think it is the duty of the local board to see that a proper water supply is furnished the village.

Dr. Peck—The village board or town board?

Commissioner Lewis—The village board.

Dr. Peck—Even if they go outside of their jurisdiction?

Commissioner Lewis—Certainly.

Dr. Peck—What I desire to know is this: Provided the State formulated rules for the protection of the water supply—which you have done in every instance—when the supply comes from outside the municipality, which board has control, the village or the town, whose duty is it to make the inspection of the watershed?

Commissioner Lewis—The first thing to do here, if the local board of health of the village wishes full authority to go outside and inspect their watershed, is to appoint an inspector, make one of your board a State inspector for that purpose. They can go anywhere in the State whether you have formulated rules or not.

Dr. Peck—That would obviate the difficulty in a measure.

Commissioner Lewis—I have appointed these State inspectors in the city of New York for the Croton watershed, the first within the last six months.

Dr. Peck—Do I understand the board of health of the village has power to go ahead and make the inspection? Or had they better wait until an inspector is sent by the board?

Commissioner Lewis—If they want to be absolutely certain of their authority, ask for the appointment of one of your men as State inspector for your watershed and then he can go ahead.

Dr. Peck—You don't say, then, the village board has power outside of the corporation?

Commissioner Lewis—I would say that a village board must confine its operations, so far as the inspection and abatement of a nuisance was concerned, to the municipality to which they belong. If there is anything to be done outside, you have got to depend on the board of the town to do it.

Dr. Peck—That is just what the trouble is.

Commissioner Lewis—It is no trouble at all, Doctor. If there is any question raised, I think you have ample authority. I don't think anybody would question your authority. If you went up along your watershed and found some nuisance existed, who would question your authority, disregarding the legal technicalities, would anybody question it?

Dr. Peck—I doubt if there would, but as health officer of the village I would be outside my jurisdiction.

Commissioner Lewis—Then if you want to be absolutely correct, it must be the board of the town in which the rule is disregarded.

Dr. Chittenden—Supposing one is health officer of both the town and corporation, does that help him, does that give him authority to go outside?

Commissioner Lewis—Yes, to the limits of the township, certainly.

Dr. Chittenden—I understand that Dr. Peck is health officer of both the township and the corporation.

Commissioner Lewis—Maybe he don't know it.

Dr. Peck—It is possible I don't know, but the fact is I do know it. I am the executive officer for the two boards. Now these boards want to know where their duty is; I want to know where I am at as health officer. The boards want to know which board it is that should send its executive officer, if you please, over the watershed.

Commissioner Lewis—It is in the township, the watershed?

Dr. Peck—Yes; and the question is under which board, which board has jurisdiction over the reservoirs and watersheds that supply the village of Oneonta with water. Now I might go a little further and say that our reservoir is outside the corporation—I am health officer of the corporation and of the town also. Now the reservoir is outside the corporation, yet in the town; yet our water comes from in the town of Springfield, three miles away, from a lake. I would not have authority to go up to that lake; that is under the jurisdiction of the health officer of the town of Springfield and the health officer of the town of Richfield and also the village of Richfield.

Commissioner Lewis—I don't think there is any question as to the fact that it is your business to see your water supply is protected. If there is any question as to who shall go there and inspect and locate this nuisance, you can have a man made a State inspector for that purpose.

Dr. Peck—I suppose I could go and inspect it and make a report.

Dr. —— —In case there is a nuisance found in the watershed of a town that is supplied with water, whose business is it to abate this nuisance; the owners of the land or the watershed, the owners of the water company or the municipality that is using the water?

Commissioner Lewis—Whose business it is to pay for it?

Dr. —— —To pay for the abating of the nuisance in the watershed?

Commissioner Lewis—Why I presume it is the water company, if you have a contract with the water company, to see that the watershed is protected. That is the natural presumption. It certainly is your duty to secure the cooperation of the local board of health that has jurisdiction at the point indicated to require them to abate the nuisance. It should be done by order from the State Department.

Dr. —— —Who will bear the expense, supposing it is the municipality that owns the watershed, or a farmer who owns the land? Will the farmer have to pay for cleaning it, or will the municipality that uses the water?

Commissioner Lewis—In case there is any distruction of property, such as moving a barn, or clearing off a field, or so on, belonging to a private individual, the same rules would apply as in other cases; if you destroy his property he is entitled to compensation. If it is the mere fact of digging a trench or turning a stream on private property, if you damage his property you have got to compensate him. If he is discharging something into a stream or is doing something contrary to law, regardless of rules, it is his business to attend to that. But if you damage his property or take some valuable right away from him he is, I suppose, entitled to compensation. But he is not entitled to defile a stream in any way, under the law passed last winter.

Dr. Wilson—Would it not be illegal for a water company to erect a reservoir without protecting it from outside influences, that is, snakes, frogs, etc.?

Commissioner Lewis—The only legal protection the State authorities have for a watershed is by the enforcement of rules issued by the State Department. On the other hand, a private water company usually makes a contract with a village to supply pure water, and they can be made, I don't doubt, to live up to their contract. The health officer should see that the watershed is suitable for that purpose.

Dr. Wilson—Supposing you were to go up there and you were to find in your tank dead snakes and frogs and all those things, what then are you going to do about it?

Commissioner Lewis—Take the usual course in dealing with such a thing. Issue an order by the board of health to the water company to clean that out.

Dr. Wilson—I have inspected that several times and I found snakes and dead frogs. One day I went up there and found, I can't tell, I fished them out, fourteen frogs that were dead in our water tank or reservoir. I notified the water commissioner of the fact and he laughed and said nothing.

Commissioner Lewis—The board of health can issue an order to the water company to have the tank cleaned.

Dr. Wilson—Well, what would that consist of, a general cleaning of the tank and filter bed and the protection of the supply?

Commissioner Lewis—Do you mean to protect the inflow?

Dr. Wilson—Yes.

Commissioner Lewis—It would not take very much protection to keep frogs and snakes out, an ordinary screen would do it.

Dr. Wilson—After the frog is dead there we get a stench, that is the thing.

Commissioner Lewis—Yes.

Dr. Wilson—And I don't care to drink such water.

Commissioner Lewis—I should not either.

Dr. McClellan (of Saranac Lake)—Suppose a health officer finds a reservoir that is polluted in anyway, is it necessary he should have an order from the board of health in order to make them clean that out?

Commissioner Lewis—If you are going to serve an order on anybody, it is necessary to have an order from the board, unless it is a standing rule of the board which you have been instructed to execute.

We will now listen to Dr. George A. Soper on the " Management of Typhoid Fever Epidemics."

THE MANAGEMENT OF EPIDEMICS

By GEORGE A. SOPER, PH. D., EXPERT FOR THE NEW YORK STATE DEPARTMENT OF HEALTH IN THE SUPPRESSION OF THE ITHACA EPIDEMIC OF 1903.

MR. COMMISSIONER AND GENTLEMEN—I have but a word to say on this topic, because those in the office here already know all I can say, and in fact when an epidemic of typhoid fever is passing through your town the best thing you can do is to send to the State Department of Health for assistance.

It has been said that for every epidemic some person should be hanged. This, like many other epigrams, contains a germ of sense, but is likely to lead to misconception. If it were our custom to hold every public officer responsible for his acts and health boards were familiar with the principles and precepts of hygiene, there is no doubt but that some person or persons would be punished as a result of every epidemic. As it is, however, epidemics usually occur before the health authorities are fully alive to the danger. Usually they see no warning; they are taken unawares.

As a matter of fact, experts in hygiene know that epidemics are not likely to occur without notice. There is perhaps a polluted water or milk supply, a defective sewer or a loose administration of sanitary principles. Frequently the signal is obscure to the lay mind and there is nothing apparently unusual to indicate that there is a clue. But it is the business of health authorities to discover the existence of danger while it is still afar off and to adopt such precautionary measures as will adequately protect the communities under their charge. Competent work in this direction often assumes a knowledge on the part of health authorities or their employees which, unfortunately, they do not possess. To comprehend the warning signals of an epidemic may require a knowledge of hygiene which can be obtained only by years of study and experience.

It is a misfortune, and, I think, somewhat of a reflection upon our universities and medical schools, that a scientific training in hygiene and sanitation can scarcely be acquired in this country. It is not so in Europe. In England, health officers are required to have a diploma testifying to their fitness for the duties to which they are appointed. On the continent, nearly every university of importance has its professor and department of hygiene, while in some countries there are whole institutions devoted to the study of the cause and prevention of disease. In America, we have no training school for health officers, we have no degree of doctor of public health, and, although our State demands a knowledge of hygiene before granting a physician a license to practice, there is scarcely a school of learning where such a knowledge may be obtained. So far as our country is concerned, the fact still holds that war, pestilence and famine are practically the sole teachers of sanitation. When our educators are so blind to the need of disseminating a knowledge of this important subject, some excuse exists, in my opinion, for the laymen who have charge of public health matters in our villages and towns and who cling with perilous faith to the old-fashioned dogma that safety will exist where immunity has always been enjoyed.

But the title of the present paper indicates that our attention is not to be directed so much to the prevention of epidemics as to their suppression. I should like to say, in summarizing the first part of these remarks, I believe we can not prevent epidemics until we raise very much the standard of knowledge of hygiene in the villages and towns. What shall be done when an epidemic has arrived?

The first thing is to know when an epidemic is on. Usually a rumor that an infectious disease is spreading rapidly and promiscuously through a community is the first intimation of trouble. This is followed by denials, usually originating with business men, who shrewdly suspect that the public fear, if not checked, will do harm to their trade. Sooner or later the facts insist upon acknowledgment and it is reluctantly confessed that an epidemic disease is prevalent. The pendulum then swings the other way. Exaggerated tales of the progress of the disease gain circulation. Symptoms of panic become discernible. The number of cases is not accurately known. To the physicians the disease is of an unknown, or practically unknown, character. It is no reflection upon practitioners to say that most of the epidemic diseases are of this class in the communities where they appear for the first time and rapidly gain foothold. In the hour of uncertainty and dread, it is imperative that the health board act with wisdom and celerity. Nothing can do more good than to take prompt steps to determine the nature of the disease, and when this is known to confess frankly its existence and prevalence.

Now a word as to real diagnosis. What has been said as to consumption is equally true here, and the words that the Commissioner has said are valuable to remember. The State will help you diagnose a consumptive and it will help you diagnose a typhoid fever patient. It is only necessary to send in a specimen of the blood—full directions are given for that to you—to get the information as to whether it is from a typhoid fever patient or not. That information, I might say, is of greater value than you would believe, if you haven't found an illustration of it. I know in the case of an epidemic when 70 people were ill—I think 5 died—where there was no reason to believe an antecedent case of typhoid fever existed in the neighborhood. The physicians said there was no typhoid, but a specimen of blood taken from a subject showed positive signs, and there was discovered sewage running from a sewer pipe into a well which supplied something over one hundred people with water. Seventy of them came down with typhoid as a result. I doubt if that investigation would have been made so successfully and so permanently valuable if it had not been the drop of blood had been taken from the ear of a suspect and examined at Albany.

When an epidemic has settled upon a community and it becomes apparent that some more than ordinary measures of public safety are required, it will be desirable to strengthen the local health board to meet the emergency or to supplant this body with a more energetic and competent head. The question arises at once, how can this best be accomplished? I do not think that boards of health in our towns and villages, or, in fact, in most of our cities, generally contain within themselves sufficient initiative and executive ability to bring about an acceptable reorganization. A board of health which has been unable to detect the danger signals of an epidemic in time to prevent the arrival of the scourge is not likely to be able to meet the difficulty when it arrives. I am talking plainly, not to members of boards of health—I wish I were—but I am talking to men who are their professional advisers, as I understand it. I believe I am talking to men whose counsels are not always followed. I think boards of health, as a rule, are not composed of men who have any extended experience or knowledge of sanitation. You are their professional advisers and if you are persistent in your views they will act. A board of health, I might say, so far as my observation and experience goes, is not wholly adequate to this work—I don't mean to say that; in most cases the boards of health in this State are sufficiently well able to take care of their needs—but if something like an epidemic comes along, you need something more to meet the emergency, you need the skill of an experienced and trained health officer. Even the health officers often are not as skillful as I assume the majority here are, and it is to them that I have special reference. Fortunately, provision exists for the assistance of stricken communities in this emergency. The State Department of Health, which by law exercises supervision and authority over local boards, may be called upon to send a representative to put on foot the sanitary measures which may be necessary in order to control the epidemic. The cost of this service need not be great and should be met by the local board, since it is only proper that the community which receives the benefit of the expert's visit should pay for the relief which he affords.

If a request for assistance is not sent to the State Department of Health and in the opinion of the State Department the safety of other communities is endangered by the inability of the local board to meet the situation, it would seem proper that the State should send its representative on its own initiative.

The representative should, in my view, be provided with ample power and authority by the State Department of Health—that is, he should be given broad instructions to introduce such measures as seem to him most suitable and appropriate—and should be required to report at frequent intervals the course of the epidemic and the progress of his work of suppressing it. I should give him large powers and hold him rigorously and strictly accountable for the exercise of that power. At the end of his service a formal report should be made which can be printed in the annual report of the State Department and there serve as a permanent record and educational tract.

The work the representative of the State will do is altogether exceptional. He will be required to have a knowledge of the State law, some features of which have been discussed here this morning. Evidently there is a diverse opinion on the subject outside of this Department. He should have a thorough knowledge of the scientific side of water pollution. Water, we all know, may be highly polluted yet not dangerous unless it is infected. He should have a thorough knowledge, of course, of disinfection, not only a knowledge of destroying infected material where it exists and as soon as it exists, but in order to avoid practices which are common in towns and villages, as a result of want of knowledge of disinfection on the part of people—the disinfection of excreta and urine in typhoid fever epidemics is uncommon. I have found a good many so-called disinfectants sold by druggists can not be relied upon, and the nurse won't learn or can't be bothered to use the disinfectants properly. I advocate that in an epidemic the State be prepared to distribute without cost disinfectants of standard quality.

Experience shows that at the scene of the epidemic the State officer should be able to carry out either of the two following lines of policy: He should be able to assume control of the local health organization, or construe his duties to be simply advisory. Unfortunately, the existing law will not sustain the first course. No matter how incompetent a local board may be, the State has given it sole power over its own territory and this power obtains so long as the local board exists. The State Department of Health may dissolve a local board if, in its judgment, this step is necessary for the public good, but unless the community affected is without a board of health for thirty days the State can not assume the direction of local health matters. These facts may result and have resulted in some embarrassment, but until the law is changed the only real authority a representative of the State Department of Health can have in an epidemic town is such as he may be able through a tactful personality to assume.

As a rule, I think it is preferable for the State's expert to consider his duties to be those of an observer and advisor, taking scientific account of all matters connected with the epidemic and giving instructions and initiating sanitary measures in a friendly and persuasive manner. The advice is pretty certain to be accepted as the surest means of relief at hand. It is in this way that the local board of health at Ithaca was supported, strengthened and supplemented to meet the severest epidemic that this State has known for many years.

The second step in suppressing an epidemic lies, in my view. in determining accurately how many cases of sickness there are, where they are distributed and when they first occurred. There is no more indispensable feature connected with the whole management of an epidemic than the collection and intelligent analysis of these vital statistics. They are at the basis of all of the remedial and preventive work of the board of health. They are like news from the front in battle, for they tell how the fight is waging.

Because physicians are not in the habit, under ordinary circumstances, of reporting their cases of infectious diseases accurately or promptly, it is desirable that the health authorities should make a special effort to have correct reports sent in. Proper reports from the physicians may be had in various ways. The State law makes the reporting of cases of infectious diseases obligatory upon physicians, and this law may be enforced and the delinquent doctors fined. Another plan is to send messengers from one office to another to collect the data. This latter method is the more practical under ordinary circumstances, since it tends to secure the amicable assistance of the physicians rather than their unwilling compliance with an unpleasant order. The cooperation of the physicians is needed in suppressing an epidemic.

Special care should be taken to detect the existence of mild, unusual and atypical cases, since an epidemic is not so likely to spread from the severe cases as from the mild ones. The cases of transmissible disease which ordinarily escape detection by the family physician are the most dangerous. It is not the patient who is sick in bed, but the one who is able to travel in the street-cars, attend church services and public lectures, and, in short, be about his business and pleasure in nearly his usual manner, who is most likely to spread disease germs. The State's expert should be prepared to visit and consult with the local physicians in the diagnosis of all suspected cases, and should take such independent measures to detect mild or aberrant forms of the epidemic disease as are in his judgment proper.

The proper activities of the local board of health should in all ways be augmented. In the event of an extensive epidemic, the number of employees of the board of health should be increasd. Along with the more scientific work of checking the disease will probably come a popular movement for a municipal house-cleaning. To encourage this can do no harm; indeed, it is desirable that the public should be requested to cooperate and asisst in the health work. It is partly for this reason that the investigation of complaints made by citizens should form a conspicuous feature of the work of the sanitary organization. It is even advisable that inspectors be delegated to various districts, to inquire into sanitary conditions before they are complained of. All nuisances should be promptly abated and the powers and duties of the board in this direction strictly observed. The sanitary ordinances of the board of health, if such ordinances exist, should be given to light, and the provisions which apply most directly to the epidemic situation should be placarded.

As disinfection on a large scale will generally be required, I think it desirable that the board prepare and distribute disinfectants of standard quality, without charge, to all houses where sickness exists. I am opposed to an indiscriminate use of disinfectants, and prefer that a great deal of attention be given to their proper application. The choice of the disinfectants to be employed and the manner of using them should rest with the State expert. In general, it will be disadvantageous, in my opinion, to authorize the employment of those chemical agents which are properly termed deodorants, or counter-odorants, and I advocate the destruction of infectious material as near its source as possible.

It may be that the original cause of the epidemic still exists, in which event it will be the duty of the expert to determine the fact and recommend to the local board such steps as it should take to eliminate it.

Often the original cause of the difficulty may lie outside of the territory of the local board, in which case the larger jurisdiction of the State's representative may be usefully employed to have the difficulty abated. Most often, however, as in the case of the typhoid epidemics, which are so common with us, the original cause of disease soon gives place to local foci, and it becomes the duty of the health authorities to direct their attention into many quarters.

But to catalog the minor duties of the health authorities in the management of an epidemic is beyond the range of the present paper. Such a treatment of the subject might well constitute a treatise of formidable length. Typhoid fever, smallpox, yellow fever, diphtheria, influenza, consumption and malaria are all epidemic diseases, which require different treatment in detail in order to accomplish their suppression when once they have broken out into local activity. Furthermore, local circumstances will always exercise a strong influence in determining just what steps should be taken to bring the epidemic to a speedy end.

As I desire to leave a perfectly clear impression of our views which have been expressed in this paper, it seems desirable to bring them together again in more compact form.

(1) The existence of an epidemic should be determined and acknowledged at the earliest possible moment.

(2) Unless the local board of health is exceptionally well provided with a skillful health officer, appeal should at once be made to the State Department of Health for a sanitary expert.

(3) The State Department of Health should appoint or send from its own force a representative with broad and sufficient powers to cope with the situation in a strong and effective manner.

(4) If appeal is not made to the State for aid and the epidemic seems likely to spread to other communities, the State should send a representative without waiting for an invitation from the local authorities.

(5) The function of the State expert should be to observe and advise the local board of health in the measures which should be taken to suppress the epidemic. If the local board is incompetent. with the assistance of the representative of the State Department of Health, to deal with the situation, the State's representative should have power to assume temporarily the duties of the local health board.

(6) Great care should be taken in diagnosing the disease, and especially to detect those mild and atypical cases which would otherwise go undiscovered and be likely to lead to the mysterious spread of the epidemic.

(7) The powers and duties of the board of health, as they relate to the sanitary condition of the community, should be fully exercised and such corrective and preventive steps adopted as the judgment of the State's expert prescribes.

(8) The local physicians and the public at large should be encouraged to aid and cooperate in the work of suppressing the epidemic, and to this end such sanitary improvements should be undertaken as are understood by the term "municipal housecleaning."

I am aware that in expressing an opinion favorable to what may be considered a State management of epidemics I am recommending a course which appears to be different from that ordinarily followed in this Commonwealth. But the departure is more seeming than real. It has been the custom on occasions of severe epidemic for the State Department of Health to send a representative to investigate the cause of trouble and to recommend measures for the elimination of the first cause. The visit of the expert has usually been brief, two or three days ordinarily being considered sufficient for his investigation. The recommendation which I make is that the State send a representative to remain long enough at the seat of epidemic to insure the adoption of measures which will bring it under the speediest control, whether this takes three days or three months. This suggestion is in reality a development of the established custom of the State Department of Health and embodies no new features except an increase in the duties of the representative of the State and a corresponding increase in his authority in order to meet the requirements of the situation.

The first thing, and the most important thing, in an epidemic, and in all health work, is to get accurate statistics so as to find out how many cases of illness exist and what is their nature. The first thing is to call upon the physicians to cooperate and assist, to send in more accurate reports than they have been accustomed to. The reports they send in from month to month can be followed in ninety-nine cases out of a hundred. This is always possible, because the State law requires that physicians do send in their reports accurately, but unless you know just when each case occurs and where you can't find out very much as to the cause of the epidemic, and of course the removal of the first cause is the most important matter, the most pressing matter. The other plan of course I have spoken of, to insist upon the physician sending in his report day by day or, as someone has said. make an example of him. I don't know where that has been done. I have never found it necessary to have a physician brought before a justice. I have always been able to secure this kind of cooperation by seeing the physician who is not sending in his reports promptly and accurately.

I would like to say a word further on the subject of diagnosis of suspected cases. As you know, the pronounced cases of infectious diseases are not those which form the greatest danger. The man who moves about with slight inconvenience, but who may be suffering from an infectious disease, giving off large numbers of disease germs, is the person who is the greatest menace. I would have these looked over carefully by the physician, as well as the more typical cases of fever, as they come under their notice, and I would advise their reporting not only cases which in their opinion are thoroughly established, but suspected cases, reporting them as suspected cases. It will be no reflection upon the physician if later many of these cases prove to be harmless.

I would suggest that the State be required to aid the local board of health in the capacity, as I have said, of an expert adviser. I would have the physicians regard the local board of health in the same light. I would have the local boards of health encourage the spread of the use of disinfectants which in practice have been found most desirable and successful—bichloride of mercury and milk of lime, etc., for cleansing furniture, etc., that might be contaminated. The decision is not so much as to the kind of disinfectant used as to the point of application. I believe you can disinfect a city when you attend to the sewer and water supply and the back yards and the alleys and outhouses. The test of the character of the disinfection in typhoid fever is in putting it at the right point.

I should advise care being taken to get discharges from the mouth. I advise the use of internal disinfectants to take care of people from probable accidents of infection of the blood. I have had a number of analyses made of urine from typhoid patients with the result that enormous numbers of the infective agents have been found there.

Boards of health can not be expected to abate these epidemics without these measures, and I would advise the local boards to call upon the State Department. That would not be a revolutionary departure, since it has been for years the custom of the State Department to send representatives to investigate causes of epidemics, to investigate the original cause and perhaps remove the original cause of the epidemic and stamp it out. I believe we transmit many diseases from person to person.

I think it better for you to have a representative of the State come, first, to discover the cause of the epidemic and advise as to its removal, and, second, determine the existence and location of the local foci and advise as to their removal and gain accurate knowledge of the existence, prevalence and distribution of the cases.

When work of this sort I have in mind has been done for a few years, I think we will have a mass of literature which will be invaluable and make in future years State aid of this character unnecessary. [Applause.]

Dr. Johnson—Gentlemen of the Convention, this paper is now ready for discussion. You are all familiar with typhoid fever; there is probably not a physician here who has not had more or less experience with it. Any views that you have upon the subject, or anything that you desire to express or present, we would be very glad to hear at this time.

Dr. Wallace Clark—I have a case which is very recent, and I think it is a very good example of finding the cause of the spread of typhoid fever.

About four weeks ago two cases of typhoid fever within one block were reported. I investigated these cases and found the source of water supply was different, and on inquiring where the milk came from, I found it came from a single cow—a neighbor on the opposite side of the road distributing milk to half a dozen families.

I went to the house and found two or three children sick. Denial was made that it was typhoid fever. Within two or three doors on the same side of the street two other children were ill. It was denied that it was typhoid fever, and they said it was simply summer complaint.

I returned to the house where the milk was distributed, and saw the woman who distributed it, and said: "Madam, you look as if you had been sick yourself." She acknowledged that during the month of August she had been confined to bed. She denied that she had had typhoid fever, and I saw her physician, and he said it was chronic dyspepsia. Her children were now ill, but that it was not typhoid.

Within four days these children were reported by the same medical man as typhoid fever, and he was also attending the two children above, and he also declared them to be typhoid fever.

I immediately proceeded to this house, determined to discover whether this woman had not had typhoid fever. I questioned her again, but my results were negative. I then requested her to allow me to collect some of her blood, which was agreed to, and that blood was sent to the Bender Institute, and the report came back that the Widal reaction was positive.

There was the source of the whole trouble. The woman attending this woman who had the undiscovered typhoid fever became ill two weeks afterwards and went home and showed typhoid fever manifestly. A boy who also drank the milk from this family returned to his home sick, and since has died of typhoid fever.

In all, then, we have twelve cases of typhoid fever springing from this one house from which the milk supply came.

Now, in looking into this milk supply, I found that the milk was brought from the barn into a back kitchen. Within a few feet of that back kitchen was an open privy. Here the excretions of this woman were deposited—typhoid fever was not suspected—undisinfected, into this privy. I got no knowledge that she in any way handled the cans of milk in any way, but maybe her nurse did. I am suspicious that flies from this privy had carried infection into her dairy.

Experiments lately made at Johns Hopkins on the fly carriage of diphtheria are very positive; and where they put flies into a cage with typhoid buillon, and then allowed them to pass into another cage where there were gelatine plates; and other flies on the opposite side went through ordinary buillon; and the gellatin plates on which the typhoid flies had passed developed large quantities of typhoid bacilli.

I feel more and more positive that a great deal of typhoid fever is conveyed by flies from privies where undisinfected stools have been deposited.

A like case of water carriage: At the head of one of my streets three or four cases were reported, which happened to be diphtheria. We have a long sewer, at least a mile and a half long, with very little fall. The excretions from these children went into this sewer. We had in the city nearly three hundred cases of diphtheria follow. I determined to find out just where they were, and collected all the cases in which diphtheria occurred, took a print of the city map, put a pin in every house where diphtheria had appeared. I am sorry I have not brought that down with me, for I think it is a very instructive thing. Nearly 80 per cent. of these cases occurred along the line of this mile and a half sewer. We had no cases until these upper cases occurred at the head of this sewer, and there were that year nearly three hundred cases of diphtheria, and three-fourths of them occurred in houses along the line of this sewer; showing again that the casting of undisinfected excreta with water carriage is always dangerous. The sewer water rises and falls. As long as the sewers are moist and damp, there is no danger of the germs being blown out of the sewer; but as the water falls and we have a drought, the walls of the sewer become dry and then they are subject to whatever wind pressure is in the sewer, to be driven out into the streets and houses.

Our sewers empty into the south side of the river, with openings five feet square, and with a north wind blowing into these sewers it was equivalent to a piston 25 feet square pushing back all the gas into the sewer, and whatever might be on the walls of the sewer would be blown into the streets and houses.

I think this case of typhoid epidemic and also the diphtheria epidemic are brought pretty nearly down to infection from one house in each case.

Dr. —— —I would like to simply say that everything that has been mentioned by the last speaker has been confirmed in my own experience over and over again.

All I want to say is this: That in the case of a sewer of that kind, there is a possibility of disinfection that is thorough, and that can be carried out on a very large scale. It is simply necessary to put, perhaps twice a week, at some point near its upper end, a quantity of five or ten pounds of sulphate of copper, into the sewer, and keep that up, and those stenches will all disappear. You can enter the sewer and walk through it, and there will be no more smell than there is in this room. In our town we had a sewer that was an object-lesson for several years, and it was treated in that way, and instead of having fifteen or twenty cases of diarrheal and throat troubles, it was nothing; it has come to an end.

I, myself, in looking over the records of the town, in reference to that particular sewer, found well onto one thousand cases of sickness within five years that were directly connected with it; and it was all ended by the method of disinfection that I have spoken of. There has been no recurrence of it in several years.

Dr. Lewis—If there is any further discussion, we shall have to postpone it until the evening session, because our cars, which we have chartered to take us to the water works, will leave the post-office at 2 o'clock.

Adjourned until 8 p. m.

EVENING SESSION

FRIDAY, *October* 9, 1903

Dr. Lewis—I understand that Dr. Curtis is now here, and prepared to answer the questions asked this morning, in regard to vaccination.

As I understood it, one question was this:

Some school officers have claimed that if the ordinary operation of scarifying the arm and applying some virus, should be certified by the health officer as a vaccination? Now, is it?

Dr. Curtis—I should not regard it as sufficient, of course. The matter of the technique of vaccination we went into last year pretty well.

A vaccination, I think, ought to be considered one in which the technique of the operation was such as is approved and one which was watched to see whether it was effective or not. I must say I think there is a great deal of inefficient vaccination done, a great deal of careless vaccination done.

Within a day or so I have witnessed some vaccination done by a health officer which was exceedingly crude, it seemed to me. I was right about not to say so to him, but he is not here to-night, so I may as well mention it.

Simply scratching the arm a trifle in one place in an indifferent fashion, without any preparation of it before, and not even watching it long enough to see that the virus was not wiped off by the carelessness or intention of the individual vaccinated—now, that I don't think constitutes a vaccination.

Vaccination ought to be done in such a way as to introduce the virus, without any changes materially, into the lymph spaces of the epidermis. It should be left uncovered, in my mind, until it has sealed itself over by drying. It would then be protected in such a way as not to interfere with its evolution. Then it should be inspected. It really ought to be inspected on the eighth day, to see what the result has been; and if that is satisfactory, and the evolution has been perfect up to that time, a certificate to that effect might very well be given. Prior to that time, it does not seem to me that a person can be said to have been vaccinated. That would be what seems to me an answer to the question.

Dr. Lewis—There is another question here in your line, Doctor:

"What is the best method for the disposal of garbage in a village of three thousand inhabitants? Has the health board any authority to order the collection and disposal of the same?"

I do not think that can be answered *in extenso*, but perhaps in two or three words you can answer it. I don't want you to give us your lecture on garbage disposal.

Dr. Curtis—I think Professor Landreth had better answer that.

Professor Landreth—I can't answer it.

Dr. Curtis—The Doctor says I must only have two or three words. I met a man yesterday whom I had not seen for three or four years, and I was telling Professor Landreth about it. He said to me: "What is the condition of the garbage question in Albany?" I felt rather hurt, because I didn't want to have my name associated with garbage, and I thought I had got rid of it by having discontinued my work in that line two or three years ago—prior to that I was on a committee of the board of health of the city of Albany having that subject in charge.

To answer the question as to the disposal of the garbage for a village of three thousand inhabitants, or so, it seems to me that the academic answer to that would be to procure (what can be procured now) a small, inexpensive crematory. Of course, I would defer to someone else in regard to a reduction plant for so small a number. I doubt if it would be possible.

I have known lots of garbage dumped into a ravine, which did not do a bit of harm; and I say it here, with Professor Landreth on one side and the Commissioner of Health on the other, it was perfectly harmless. But I would not recommend that; and that is not an academic answer to the question.

You had better burn it up; and you can do it in an inexpensive way.

As to the right of a board of health to order its collection, I doubt if that right exists. I think no right ought to be assumed by a board of health that you can not go to court and be warranted in sustaining. That is a power that lies with the more profane part of the city government.

Dr. McCarthy—I will tell you how we dispose of it at Seneca Lake, if you would like to know. We simply have an efficient man that takes it up twice a week and takes it up on a lot and burns it. We have enough barrels and boxes that go with it to enable us to burn it very effectively, to get rid of it very thoroughly anyway. We find it inexpensive, and it does the business.

Dr. Lewis—Then you answer the second part of the question, "Has the board of health the right to order its collection and disposal," that they have the right to order its collection and disposal?

Dr. McCarthy—We appealed to our trustees, and they gave us the money to do it.

Dr. Lewis—Here is a question which I think the audience ought to answer; and it is a real question:

"Do barking dogs constitute a nuisance within the authority of the health board?"

We get frequent complaints of this kind. The answer to that, if we wish to make an answer, would be that the board of health can pass an ordinance or resolution which will make it a nuisance, and it is the duty of the health officer to abate it in any way he finds available.

There are two questions here regarding the right to compel a person to connect with a public sewer.

There is no question that the board of health is perfectly competent to pass an ordinance requiring all people to connect with the sewer where it is possible to do so.

A Delegate—Must that ordinance be of general application, or a special order in each individual case?

Dr. Lewis—It should be a general order.

A Delegate—And be universally enforced?

Dr. Lewis—Such an order should be a general order, in order, if nothing else, than to protect the board against a possible charge of favoritism or otherwise.

A Delegate—But not necessarily of universal enforcement?

Dr. Lewis—My judgment is that it should be of general enforcement.

A Delegate—In the judgment of the board? You could not compel every householder to go into the sewer necessarily.

Dr. Lewis—You might undertake a larger contract than you could fill, you know.

A Delegate—Yes, I think you would.

Dr. Lewis—I am not responsible for everything I say, in legal matters.

Now, here is an important question:

"Should a health officer manage a case reported to him as contagious—scarlet fever, for example—when he is satisfied the attending physician has made an error in diagnosis?"

Doctor Curtis wants to answer that.

Dr. Curtis—I should advise him to take counsel and let someone else decide. I say that because I have known some cranky health officers who have done that very thing, and I think the health officer was no more likely to be right than the attending physician. Either one of them might be imperfect in his diagnosis. Of course, the health officer, if he believed the case to be one of scarlet fever, where the attending physician did not, he would be fully warranted in maintaining a quarantine.

I question whether he should be judicial in the matter and reject from quarantine a case where a physician (at least a reputable and conscientious one) had made that diagnosis. I think it would be doubtful; it would be unwise.

Dr. Mason—A health officer has no right to examine a case until it has been reported.

Dr. Curtis—No right to pass on the matter?

Dr. Mason—No.

Dr. Curtis—He has the right to pass on the matter as to the case being one of smallpox, or scarlet fever, if in his judgment there is reason to believe it is; and the opposite would be true.

Dr. Mason—I mean, suppose a physician comes to me and says so and so has a case of scarlet fever and orders a quarantine, the health officer has no right to go and examine that case?

Dr. Curtis—I think so. Why not?

Dr. Mason—He is going beyond his duty as health officer.

Dr. Curtis—No, I think not. In the protection of the public health, he has the right, and it is his duty, to ascertain the facts.

Dr. Mason—He has the right, if the party under quarantine is objectionable to quarantine, and says he is not subject to it; they have then the right to call in counsel, and if the physician they call in disagrees with the attending physician, then the health officer names the referee.

Dr. Curtis—I don't understand just what you mean. You don't mean to say that it is not the duty of the health officer, by virtue of which he is a health officer, to pass judgment on the nature of the disease?

Dr. Mason—No, sir.

Dr. Curtis—Well, I think it is.

Dr. Mason—That is what the law says, that it is not.

Dr. Peck—I have always considered that when a case was reported to me as a contagious disease, that, officially, it was. I took no chances; I quarantined it. I would not set myself up as knowing more than my neighbor.

But I have quarantined many a case when I was satisfied that it was not a contagious disease. I have kept cases under quarantine for four weeks when I knew they had nothing but measles, in order that the physician might have a trained nurse and all that sort of thing, when I knew that it was not a contagious disease. He had a trained nurse before I had seen the case, and the question has arisen whether I really had the right to do that. I have done it repeatedly, in order to protect my brother physicians. In one case where a family—it seemed as though they were situated so that they could not be imposed upon, the young man was a student in the normal school and his mother was keeping house for him—and I was called to see the case, reported as scarlet fever, but it was measles without any doubt; and in that case I did as Dr. Curtis suggested; I took counsel, and of course it was pronounced what it was, measles (it had all the symptoms), and after a few days we concluded to quietly remove the quarantine, which we did. But the physician has never got over it until this day; and I would like to hear from others just what the custom is in cases of that kind—when they are satisfied the physician has made a mistake in the diagnosis.

Dr. Lewis—We cannot spend a great deal of time over these questions, but if you will allow me to say a word or two, I would like to be permitted to, in regard to what I would do and what I have done, since I have been Health Commissioner of the State.

If I were called in to see a case of that description where I found that a wrong diagnosis had been made, I would see the physician and explain to him that I believed he was mistaken. I would not go to the newspapers with it nor to his neighbors, but I would say: "Doctor, it is not smallpox, it is chickenpox. Now you have the case quarantined. We will continue the quarantine for two or three days more, and then state to them that in our judgment it is not necessary to continue it any longer."

I don't believe it is your duty, or mine, or anybody's, to stand by a man when he is absolutely wrong in practice, in medicine or surgery, or in health matters either. [Great applause.]

Now, how can you quarantine a patient when you don't know what disease he has, except from some report that has been sent to you? I don't believe that one of you gentlemen has a right to put any patient under quarantine until you have personally examined him and found out whether he ought to be quarantined or not. [Applause.]

I furthermore believe that, if you go to the family physician or attending physician, in the way that we usually go to them, and say: "Doctor, it is my duty as health officer to see what this case is"—it is your duty, and you have the right under the law, to enter any house in your jurisdiction and satisfy yourself of anything which relates to the public health or the health of the community over which you preside—now you go to the physician, and he says: "I am perfectly satisfied that this is scarlet fever; come along;" and you go along with him, and when you have examined the case and are satisfied that it is a man unjustly under quarantine, you know what to do; but unless you have personal knowledge, I can not imagine where you have any right to act at all.

I saw Mr. Church come into the room. I hope he is still here. I wish he would tell us now, after our opinions have been given, whether they are legal or not.

Mr. Church—What is your question, Doctor?

Dr. Lewis—The question has arisen, Mr. Church, as to whether a health officer has a right to visit a suspected case of contagious disease that has been reported to him, before putting it under quarantine.

Mr. Church—I think he unquestionably has that right.

Dr. Mason—I don't think that is the question.

Dr. Lewis—Let me try again. The question has been asked—we will divide it. Has a health officer a right to go and examine another doctor's patient when he reports a case of smallpox, to satisfy himself that it is smallpox?

Mr. Church—I think he has the right.

Dr. Lewis—Then the second part of the question would be: Is it proper that he should establish a quarantine in a case where he has not made an examination to satisfy himself that it is a contagious case?

Mr. Church—No; I think it is his duty as health officer to be sure that the case in question is a contagious case before he quarantines it.

Dr. Peck—That is a vital question. Is not my neighbor's opinion just as good as mine? I get a physician to go and verify my opinion; the attending physician gets another one. We get into a squabble right away. Must not I, as health officer, consider all cases reported to me as contagious to be contagious? There is no question about the right of the health officer to visit that case and see what it is like; in fact, it is his duty. I can hardly conceive how he can quarantine a case without visiting it; but I have felt all the while that if a physician reported a case to me as a contagious disease, it was my duty to treat it and regard it in my own mind as a contagious disease.

Dr. Lewis—And quarantine it without visiting it?

Dr. Peck—No, sir; visit it every time. Never quarantine a case without visiting it. I say to a physician: "Doctor, you have made a mistake; this patient has the measles simply; this patient has the characteristic eruption and all that sort of thing." He says: "I have sent to Albany for a trained nurse. We have got to pay her. They are able to pay." What am I to do? His opinion is just as much thought of in the village as mine. What shall I do? It comes right home. I would like to know if I have a right to set up my opinion against the whole village of Oneonta.

Dr. Lewis—Does not the mere fact that Dr. Peck is a health officer make his opinion worth more than the other man's? Certainly Dr. Peck would not ask us to perpetrate a fraud upon a family for the purpose of helping out some neighbor of his. That is a question of common honesty.

A Member—The health officer is understood to be the State's expert, and people look up to him as such, and his opinion is always referred to. I had a case of that kind come up, and it seems to me there would be no difficulty if the health officer is satisfied that he is right, but that he has the right to go ahead and do as he chooses in the case.

Dr. Lewis—And if there is a question of doubt, call in other experts. That is the way to settle it.

I am afraid some of these questions will have to go over until next year, gentlemen.

We wish to hear from Mr. Stuart, about "Some Points for Registrars."

SOME POINTS FOR REGISTRARS

BY MR. STUART

MR. COMMISSIONER AND GENTLEMEN—My purpose in addressing you is to point out some of the serious defects in local registration, as evidenced in certificates received by the State Bureau of Vital Statistics, and to endeavor to make clear to registrars how such defects may be remedied in the future.

It should be understood that correct records of births, marriages and deaths are of the greatest value to the State statistically, as well as for legal and administrative purposes, while incorrect records are valueless; the necessity, therefore, of care in securing complete records is obvious.

Before adopting the present form of blank birth, death and marriage certificate, a great deal of study was given to the subject, that only such information should be required as was necessary to make the records of value, and as no needless information is asked for, it is the duty of local registrars to secure as complete reports as possible of the different events.

While it is made the duty of local boards of health to supervise and make complete the registration of all births, marriages and deaths occurring within their respective municipalities, it is claimed by the last United States census (that of 1900) that outside of the city of New York some 12,000 births occurred in this State of which there are no local records, while in the same period 5,000 marriages and 3,000 deaths failed of record.

You will therefore no doubt appreciate the great importance of your adopting such measures as will insure complete reports of the births, marriages and deaths in the future. Registrars upon receipt by them of certificates for registration should examine them carefully, and, if defects are found, cause them to be remedied before placing the certificate on record; while it may not be possible for registrars in the larger cities of the State to determine whether or not the information given in the certificates is correct, it would seem possible to do so in the towns, villages and smaller cities where the residents are better known to each other.

A common error in many certificates received at the State Department is the failure to properly fill out the upper left hand corner of the certificates, the county is many times given without stating the city, town or village of such county in which the birth, marriage or death occurred.

In birth certificates the name of the child is not stated on the line indicated by "Name of Child," it being necessary for us to secure the information from the line "Father's Name." Thousands of certificates are received each year where there is no given name for the child; this defect can be very readily overcome if the registrar upon receipt of such a certificate will furnish the parents with a "Given Name" card to be filled out and returned to the registrar after the child is named; upon receipt of such card properly filled out, the local record of the birth of the child should be completed, after which such card should be sent to the State bureau to be filed with the original certificate of birth.

Death certificates are often defective in a failure to give the full name of deceased; for example, the name of *John B. Smith* is given as *J. B. Smith,* and again *Mary Smith* is given as *Mrs. J. B. Smith.* The place of death, which is important, is many times not stated, while in many cases the date of death as well as the age and sex of deceased are omitted from the certificate.

While deaths should always be recorded in the municipalities in which they occur, it is found in many cases that a death occurring in one municipality is recorded in another, the undertaker, if he lives in a municipality other than that in which the death occurs, presents the death certificate and secures a burial permit thereon from the board of health in which he resides instead of presenting the certificate to the board of health where the death took place.

Another frequent error is that of a justice of the peace making and signing a death certificate for which there is no authority under the law.

Physicians often commit the error of filling in the upper left hand corner of a death certificate with the name of the place in which they reside, instead of that in which the death occurred.

Another fault: For example, a resident of Dolgeville is taken to the Little Falls Hospital for treatment and dies there; instead of recording the death in Little Falls and securing a burial permit there for burial at Dolgveille, the undertaker presents the death certificate to the board of health of Dolgeville and obtains a burial permit from such board.

Marriage records are many times defective in consequence of failure to state the place of marriage, also in the neglect of the witnesses to the marriage to sign their names on the face of the certificate, as well as the failure of the contracting parties and witnesses to their signatures to sign the reverse side of the certificate.

Still births. There is a prescribed form of blank known as "Still Births" for use in such cases, the blank taking the place of a birth and death certificate. While still birth records are not required to be sent to the State bureau, all local boards of health should record such events in a separate book, filing the certificates in their offices.

The local board of health may be in a position to comply with the law as to records of births, marriages and deaths occurring within their respective municipalities. They should adopt rules requiring physicians, clergymen and others to make prompt reports of such events. The rules should carry penalties of a fixed amount and the penalties should be enforced whenever violations occur.

If this course is pursued it is thought that those required to make reports to local boards will soon appreciate the fact that the rules must be complied with.

Dr. Lewis—I would like to just emphasize what Mr. Stuart has said in three or four words. If every registrar and every health officer remembered and realized that these certificates are by the law made legal evidence, they certainly would appreciate the necessity of their being accurate in every respect. The legitimacy of children, the validity of marriages, the disposition of estates, everything depends sometimes on the certificates that you send to the department for safe keeping, and they should be absolutely correct.

Dr. Greene (of Buffalo)—Of course you understand that Buffalo, New York, Albany and Yonkers do not report to the State Commission, and therefore they are not named in the list of those who send in so promptly. Why I do refer to it is this: A priest in Buffalo married a couple a few years ago and refused to send a certificate in to the department. It involved a litigation which was brought on which involved $300,000. The parties went to the priest and asked him to file it with the department, but he said he would not do it, but gave them a certificate and it went to Europe and came back, the authorities saying that was not evidence, but that it must come from the department of health, with its seal, and he then refused, and we had to go to law and have him arrested before he would file it with the State Department, which he ultimately did, showing the importance of things of that character.

Dr. Lewis—I now have the pleasure of introducing to you Dr. Ernest J. Lederle, president of the New York city board of health.

THE PROTECTION OF THE MILK SUPPLY OF CITIES

BY ERNEST J. LEDERLE, PH. D., COMMISSIONER OF HEALTH, NEW YORK CITY

In considering the question of the sanitary control of milk supplies of cities, in which, by reason of my connection with the department of health of New York city, I have for some time been interested, it is important to note how methods of milk sanitation have changed in recent years, owing to our advanced knowledge, especially that brought about by the science of bacteriology. Some years ago our whole efforts were directed to obtain a supply of milk which should not fall below a certain standard of composition—that is, we consider milk only from the standpoint of its food value. During the last few years, sanitarians have directed their best efforts to the production of clean milk—that is, a milk free from dirt, free from excessive nonpathogenic bacteria and entirely free from pathogenic germs.

This at once opened up a new important phase of work for the health officer of every city and town, and necessitated a control of milk supplies on entirely different lines. In brief, the reasons for demanding a clean milk supply are:

1. Milk should come from healthy animals.
2. An impure milk soon deteriorates, and produces those products of bacterial growth, toxins, etc., which are so injurious to the infant. Under certain unfavorable conditions, according to Vaughn, a specific poison—tyrotoxicon—is produced in the deterioration of milk. Through improper handling of milk infectious diseases, as typhoid fever, scarlet fever, diphtheria, etc., are spread.

During the summer of last year in one of our boroughs 86 cases of typhoid fever were traced to one case of the disease in the family of a milkman who had supplied all of the families of those taken sick. The well was found contaminated; ordinary sanitary precautions had been neglected.

It being conceded that milk when improperly produced, carelessly handled and improperly cared for, may become a serious menace to the health of a community, what steps can the authorities of a large city like New York take as protective measures?

Permit me to recall to you the special conditions that confront us in our city, then briefly to state what protective measures we are taking, and to invite your criticism and discussion.

The subject may be divided into two branches:

(a) The protection of the supply during distribution to consumers within the city limits.

(b) The protection of the supply beyond the city limits: Control of production and transportation.

City Control

The control from the standpoint of composition is comparatively easy to carry out, being in the main a question of a proper legal standard and efficient inspection. The legal standard for milk in New York city is the same as that of the State: Fat, not less than 3 per cent.; water, not over 88 per cent.; which is among the lowest of standards, the following cities having higher:

		Solids	Fat
Washington		12.5	3.5
New Orleans		13	3.5
Boston..	Winter	13	3.7
	Summer	12	3
Minneapolis		13	3.5
St. Paul		13	3.5

The result of a low standard is that the public does not usually receive milk in the condition it comes from the cow, but there is the strong inducement to reduce a naturally rich milk until it just reaches the legal standard, and there is no incentive for improvement. Not until milk (as other commodities) is sold on its merits will this condition be changed. Curiously enough, skim milk can not be sold in New York city even when so designated. This deprives a large class of our population of the use of a cheap and valuable food. The perplexing problem of an adequate means of control of such sale has heretofore restrained the authorities from changing their regulations. Whether or not this is an adequate reason is open to question. My own opinion is that some day the sale of skim milk (under very carefully guarded restrictions) will be approved.

Following is a brief outline of the method of milk inspection of our city:

For the purpose of milk inspection, the city is divided into districts, to each one of which an inspector is assigned. In his routine work, this inspector goes from place to place, examines the milk by means of a lactometer, and takes its temperature. In case the milk appears to him to be unadulterated, he simply makes a note of the fact in his inspection book, together with the readings of his instruments, the name and the address, and permit number of the dealer.

If for any reason, either on account of the lactometer reading or the appearance of the milk, he suspects the sample to be adulterated, he fills two four-ounce bottles from his cylinder; one of those he seals by passing a wire through perforations in the neck of the bottle, through the cork and around a lead button which is pressed down by means of a punch, bearing the inscriptions of the health department on one side and the inspector's distinguishing seal on the other. The sealed bottle he leaves with the dealer. The other he delivers to the chemist at the department laboratory, where an analysis is made, and if the milk is found to be adulterated, the dealer from whom it is taken is arrested and brought to trial.

In addition to his store inspections, the inspector often begins work at three or four in the morning, in order to meet the wagons of dealers while delivering milk to the retailers. The method of inspection and taking of samples is similar to that carried on when inspecting stores. In addition to the routine inspections in the district, milk "raids" are made at regular intervals. These raids are made either at the railway stations and ferries or other points of entry into the city, or are made in the city itself, among the stores or wagons delivering milk. In the case of raids, the inspectors work in squads accompanied by a suitable number of police officers, stopping the wagons as they leave the railway platform or come from the ferryboats, examining the milk and taking samples which, as before, are delivered at the chemical laboratory. In all cases they leave the sealed duplicate samples with the driver of the wagon. In these raids as many as 400 samples are collected in one night.

When raids are made on stores, the inspectors are given instructions to collect samples from all stores visited in a particular section of the city, and use no discrimination in their selection. In this manner the department can obtain information as to the general quality of the milk entering the city at any given point. It has been the practice to cause the arrest of a dealer only when the milk is found to be 5 per cent. low in solids—that is, when the total solids are 11.40 per cent. or less. If the solids are found to be less than 5 per cent. low, a warning is sent to the dealer, and a reinspection is made shortly afterwards. These reinspections are repeated until the milk sold by the dealer is found to be above the standard.

New York consumes about 1,500,000 quarts of milk daily, distributed through 12,000 stores by means of 4,000 wagons, each of which is required to have a permit from the department of health, which permit is issued after application has been made in writing and the condition of premises or wagon is found satisfactory. It is interesting to note that this permit system has recently been bitterly assailed in the supreme court as being unconstitutional, but was sustained, and also sustained in the appellate division, and is now in the United States supreme court. The present system is of great value as a means of control, and no city should be without it; 95 per cent. of the city's milk supply comes from outside its limits, the area covering 55 counties in five different States, and some points as far as 500 miles away.

The following statistics give some idea of the work of our milk inspection division:

	Milk inspections	Samples taken	Fines collected
1901	39,227	2,336	$3,090
1902	30,680	14,639	10,490

In order to aid the public and the milk dealers to obtain milk of good quality, we have made arrangements to examine for them free of charge all samples they submit to us, and to this end have circulated the following notice:

FREE EXAMINATION OF MILK SAMPLES

Milk samples will be examined free of charge at the chemical laboratories of the department of health, Fifty-fifth street and Sixth avenue, borough of Manhattan, and 38 and 40 Clinton street, borough of Brooklyn.

Samples will be received any week day except Saturday, between the hours of 9 a. m. and 4 p. m.; Saturdays from 9 a. m. to 12 m.

At least one-half pint of milk must be delivered for examination. In taking a sample of milk for analysis, care must be used to mix the contents of the can thoroughly in order to be sure that the sample fairly represents the whole.

In the case of bottled milk it is preferable to deliver the unopened bottle. If a smaller sample is taken the same precautions must be observed in sampling as in the case of milk taken from a can.

Sample bottles must be clean, and milk must be fresh when delivered for examination.

CLEAN MILK

Coming now to the matter of a clean supply, it is only during the last few years that the department has given much attention to this phase of the work, and it is only since last year that this work has been systematically carried on by us. It began with bacteriological tests of samples of milk as delivered by the dealers, and the tracing of unusually bad samples to the dairy in the country. In almost every case the proof was substantiated that the bacteriological contents are an index to the cleanliness of the milk, the condition under which it was produced, or the method of subsequent handling. We of course had the usual experience of finding that in very many instances the milk was produced under such atrociously filthy conditions that the surprise was it could be transported any distance at all. The conditions surrounding many of our cow stables are a disgrace to our civilization, a very grave reflection on our sanitary authorities, and a menace to the health and lives of the consumers of the milk therefrom. I can not express myself too strongly on this point, and only wish I could arouse the public to appreciate the existing conditions; this would insure a change everywhere. What a stubborn up-hill fight it is to change these conditions! In one of our suburban boroughs, that of Queens, the condition of the greater number of dairies was found last year to be so bad that immediate changes were ordered, which orders were resented and not carried out. After tiresome legal squabbles, in which we found ourselves badly supported by even some magistrates, we resorted to drastic measures, and declared the places public nuisances, ordered them vacated, and sent the cows to the public pound. As the pound master charged $3 per day for each cow, our orders were quite promptly obeyed in the future. The new system has been introduced into the other boroughs. The bad conditions found outside of the city, and therefore out of the jurisdiction, were much more difficult to cope with. That any inspections could have been carried on at all in the State beyond our city limits has been due entirely to the assistance given us by Dr. Daniel Lewis, State Commissioner of Health of New York State, who at once interested himself when the matter was presented to him and who appointed our own inspectors on his staff (without compensation), thereby enabling them to make inspections anywhere in the State. This has been the greatest help to us, and enabled us to send to all the main shipping points of milk along the lines of the various milk shipping roads. The inspectors after a thorough examination of the conditions under which the milk was produced at a particular farm, would make suggestions for improvements, and impress on the proprietor the necessity for cleanliness, proper cooling, and all the conditions necessary for the production of the pure, clean milk, with which you are all, no doubt, familiar. Further tests were made in the city after changes had been made at the barn, the dairy, etc., and the effect noted. If no attention was paid to our requests, the permit to send milk into our city is withdrawn.

On the other hand, encouragement is also given to those making sanitary changes and producing milk of a certain standard of cleanliness required for the so-called "certified milk;" and its vendors also profit by the high price which this commands.

TRANSPORTATION

It was found that although all precautions were taken at the farm, the milk would often come to the city in bad condition, and it was soon learned that on some railroads little or no care was exercised in the transportation of the milk, which resulted in the following notices to the railroad officials, which regulations are now quite generally carried out:

"We beg to call your attention to the importance of having milk cars upon your line properly iced. With the approach of hot weather nothing is so essential to the purity and wholesomeness of this city's milk supply as care in transportation. Upon the purity of the milk supply in this city during each summer depends the lives of a number of persons, and this is particularly true of children. This department accordingly looks to you to give your personal attention to the care of milk in transit on your line, in the interest of the public health."

Last summer this form was used in addressing the railway officers:

"Sir—The Board of Health desire to notify you that the following resolution, which was adopted on August 5th, 1901, will be strictly enforced during the coming summer:

"'That no milk shall be brought into the city of New York the temperature of which is higher than 50 degrees Fahrenheit; or shall anyone keep, have, or offer for sale, in said city, any such milk.'

"In order that the temperature of the milk when delivered during the summer months shall be less than 50 degrees Fahrenheit, it is necessary that suitable cars be provided; that the milk be delivered on the cars at a low temperature, and that sufficient ice be placed directly on the cans and bottles to keep them below the required temperature during their transportation to this city.

" In order that the proper arrangements may be made and that sufficient ice may be provided, it is important that the railroad officials confer at this time with the farmers and dealers along their respective routes, so that no unnecessary difficulties may be encountered in complying with the regulations of this department.

" The board requests that you will give immediate attention to this matter."

A prompt delivery of the milk from the railroad cars to the stores and dealers is necessary, as well as the milk should thereafter be kept under the proper conditions. So much difficulty was experienced in trying to have all milk kept in stores at proper temperature that we found it necessary last summer to issue the following regulation:

" *Important notice to vendor of milk.* The sale of milk having a temperature of more than 50 degrees Fahrenheit is a violation of the Sanitary Code and of the regulations of this department. Such milk becomes unfit for human food, and its sale is therefore prohibited. The violation of this rule will be held by the department of health to be sufficient grounds for the seizure and destruction of the milk, and the revocation of the permit to sell milk.

" By order of the Board of Health.

" ERNEST J. LEDERLE, Ph. D., *President.*"

A further regulation relates to the keeping of milk in stores opening into bedrooms, and is designed to prevent the spread of infectious diseases by milk. The following notice is sent to those places where such conditions exist:

" Dear Sir—The department of health has insisted that the room in which milk is sold should not communicate with one which is used for living or sleeping purposes, because:

" 1st. Milk readily absorbs odors from the surrounding atmosphere, and is thus rendered more or less unsuitable for use.

" 2d. Milk furnishes an admirable medium for the growth of many kinds of disease-producing germs, and through it may be readily transmitted such diseases as tuberculosis, typhoid fever, diphtheria, scarlet fever, cholera, influenza, dysentery, and probably some others. If any person sick of any one of these diseases is present in the sleeping or living room, unless the greatest care is exercised, and even in spite of this, the germs producing these diseases may be conveyed through the atmosphere, or by the hands or clothing of those in contact with the sick person, to the milk, and thus the milk becomes contaminated.

"It is for these two reasons that this regulation of the department of health has been enforced."

The enforcement of these regulations has caused considerable feeling, as about 2,500 stores in the borough of Manhattan alone were involved.

If they permit us to seal the connecting door, we grant the permit to sell milk—not otherwise. Here is the result of this work:

Number of orders issued relating to sleeping rooms, 1901, none.

Number of orders issued relating to sleeping rooms, 1902, 1,155.

Milk is sold principally in groceries, also in butter and egg stores, milk dairies, delicatessen stores, and in bakeries and candy stores.

As a rule a grocer sells milk not because of any special inducement of profit on its sale, but because it is a convenience to customers who are buying bread, butter, etc., and who insist on purchasing milk at the same time. The result is that no special care is given to the handling of milk, and it is difficult to enforce the regulations regarding it. I am firmly convinced that most grocers would gladly discontinue the sale of milk provided that all would give it up. I would be glad to see the sale of milk confined to special stores, and am now inducing large concerns to open model milk stores in our tenement districts.

STRAUS MILK

There are various influences at work in our city which are educational in their relation to the sale of pure milk, and practical in their results, and which aid us in our fight for a sanitary milk supply; one of the most important is the Straus milk charity carried on for years by Mr. Nathan Straus, who is so well known as a philanthropist in this connection. During the last summer, twenty-three places were established by him in the crowded tenement districts and public parks. Here pasteurized milk, modified milk, and ordinary milk are sold at nominal prices, or are dispensed free on tickets of physicians. Thousands of these tickets are given out by our medical inspectors every summer. There has been so great a demand for this milk that some of the stores are to be continued during the winter.

CERTIFIED MILK

A committee of the County Medical Society of New York is authorized by that society to issue certification labels to certain dairies to place on their bottles of milk after such dairies have been inspected and found to come up to the requirements of the committee; the dairies are subject to periodical inspection and tests. Such milk commands a higher price than usual market milk, from 10 to 16 cents per bottle, and its use is being greatly extended. This is a great education to the farmer, and the higher price is an inducement to make improvements. Sterilized milk is very little used. The consensus of opinion of those who have made a specialty of infant feeding appears to be in favor of clean milk without any heating process whatever.

I have come to the conclusion that in order properly to regulate the milk supply of New York city it will be necessary to cooperate very closely with the State Department of Health and the Agricultural Department. I hope soon to recommend some regulation which will compel all producers of milk to apply for permits, these permits to be issued only on certification by local health authorities. This is a matter affecting not only our own but other States, and some interstate cooperation will be necessary for complete and successful control.

In our city, on an average, about 85 per cent. of the deaths from diarrheal diseases occur under the age of two years. About 75 per cent. of all deaths from diarrheal diseases occur during the months of July, August and September, so that the accompanying table, representing the deaths from diarrheal diseases during those months in the most densely populated borough of the city, gives an accurate idea of the good accomplished by consent supervision of the milk supply and sanitary conditions:

BOROUGH OF MANHATTAN

Deaths and Death-Rates from Diarrheal Diseases of Children under Two Years of Age for Months of July, August and September

YEAR	Estimated population under two years of age	Number of deaths	Death-rate per 1,000 children living at two years of age
1898	82,865	2,429	116.5
1899	83,835	1,661	78.7
1900	84,816	1,956	91.5
1901	85,809	2,015	93.2
1902	86,813	1,617	74.0
1903	87,829	1,473	66.6

In the last column is stated the death-rate from diarrheal diseases under two years, during July, August and September in the borough of Manhattan, and it reads, that out of every thousand children living at two years of age, 116 died during these months from diarrheal diseases during the summer of 1898.

During this past summer only 66 out of every thousand under two years died from diarrheal diseases; a saving of 50 children in every thousand living, or 1,097 lives.

Table showing number of milk samples received every month, with number adulterated and number unadulterated, and percentage of the total found adulterated, during 1901

MONTH.	Total	Adulterated	Unadulterated	Per cent adulterated
January	107	55	52	51.40
February	69	32	37	46.46
March	122	53	69	43.44
April	200	89	111	44.50
May	139	66	73	47.67
June	90	45	45	50.00
July	133	60	73	45.11
August	97	58	39	59.79
September	58	32	26	55.17
October	146	53	93	36.30
November	99	48	51	48.48
December	74	33	41	44.59
Total	1,334	624	710	46.70

Table showing number of milk samples received each month, with number adulterated and number unadulterated, and percentage of the total found adulterated, during 1902

MONTH	Total	Adulterated	Unadulterated	Per cent adulterated
January	75	47	28	62.67
February	121	75	46	61.98
March	259	156	103	60.23
April	302	193	109	63.91
May	387	209	178	54.01
June	682	438	244	64.22
July	558	337	221	60.39
August	526	250	276	47.53
September	290	136	154	46.89
October	306	121	185	39.54
November	337	85	252	25.22
December	127	48	79	37.79
Total	3,970	2,095	1,875	52.77

Table showing number of milk samples received each month, with number adulterated and number unadulterated, and percentage of the total found adulterated, during 1903

MONTH	Total	Adulterated	Unadulterated	Per cent adulterated
January	63	39	24	38.09
February	161	81	80	49.69
March	414	147	267	64.49
April	283	124	159	56.18
May	881	431	450	51.08
June	683	448	235	34.41
July	514	361	153	29.76
August	555	431	124	22.34
September	780	639	141	18.07

Dr. Lewis—This interesting and valuable paper is now before you for discussion.

Dr. Greene—The paper is certainly highly interesting because of milk forming so large an element of the food of the human being and especially of children, and the precautions which the Doctor has taken in New York city are certainly admirable.

I don't know as I could agree with him, perhaps, upon the pasteurization of milk. At least, speaking from my own experience, it is desirable in many cases, although in the city of Buffalo we have not come to the point where we can make the milk carriers bring the milk down to 50 degrees before it is delivered on the platform. We have not advanced far enough. It is proper and right, and I think that soon perhaps Buffalo will be able to shake off its lethargy and perhaps get up with that standard.

I would like to ask Dr. Lederle if small grocers who sell milk and have a dining-room or kitchen opening directly behind the store are permitted to sell milk—if they should not be permitted to sell milk.

Dr. Lederle—Not quite as strong as that, perhaps. It is principally in connection with living rooms. We have some of these cases in connection with bakeries. I don't know of a grocery selling milk in that way.

Dr. Greene—Where a customer comes in and wants a quart of milk, they have a long handled dipper with which they dip it out. Do you allow that grocer to have an opening into the kitchen or dining-room?

Dr. Lederle—Into a kitchen sometimes, but not into a bedroom.

Dr. Greene—Why not a kitchen or dining-room?

Dr. Lederle—We have 2500 of those and we have to go a little slowly on that. It is really an educational matter and very difficult to enforce.

I think you misunderstood me in regard to pasteurized milk. I said sterilized milk, commonly boiled milk.

Dr. Greene—I don't see why they should sterilize milk.

Dr. Lederle—This Straus charity supplies pasteurized milk, and it is very successful.

Dr. Greene—We have not enough inspectors in the city of Buffalo. The city of Buffalo only has two inspectors given by the city.

While I am on my feet I want to speak of another of the shortcomings of Buffalo. In every city I know of, after a case of scarlet fever, it has a corps of inspectors who go around and inspect the house. The board of aldermen in Buffalo will not grant the health board any such authority, but when a person has had scarlet fever or diphtheria in the house and the doctor believes that the case is well, if the doctor says the house is disinfected, we are compelled to take down the quarantine sign, even if they have only put a little chloride of lime in the room.

That is getting off from the subject of city milk, but I wanted you to know that we are striving for the ideal in Buffalo, but have not attained it yet.

Dr. Goler—I have been very much interested in what Dr. Lederle has had to say in reference to the milk supply of cities.

We have been trying in the city of Rochester for the past six years to evolve a system of prophylaxis in milk inspection, and while I want to speak of one or two points, I will with your permission outline what we have done in Rochester in the last six years.

The Doctor spoke in the fore part of his paper of tracing out some 80 odd cases of typhoid fever to one milkman.

We some years ago devised this scheme: Whenever we have a case of infectious disease reported to the health office our inspector is sent to the house. He there finds out the name of the man supplying milk to the family. That name is entered with a lot of other data in a book. If any given milkman within a month has more than three cases of a similar infectious disease in his milk route, our milk inspector immediately looks up the source of that milk supply, and in the past six or seven years we have in that way from data gathered in that way wiped out at least ten small epidemics of typhoid fever and scarlet fever that have been traced to the milk supply.

We do not let the epidemic gather headway. We attempt to suppress the epidemic by preventive means before a larger number of cases have developed.

We take in the city of Rochester about 4,000 samples of milk a year. We have a population of 167,000 people and we have but two milk inspectors to do that. Our system of milk inspection is substantially that which Dr. Lederle has outlined, but we have gone a little further than that.

In 1898 and 1899 we had our chemist, with our bacteriologist, collect in tubes a number of samples of milk. There were 86 samples involved which showed an average of 837,000 bacteria per cubic centimeter, excluding 26 per cent., which contained over 5,000,000 bacteria per cubic centimeter.

We thought that was sufficient to warrant notification to the milkmen and we sent out the notification telling all of the milkmen in the city that thereafter 100,000 bacteria per cubic centimeter would be taken as the standard of the dirt supply of the milk of Rochester.

In 1900, 319 samples of milk averaged 796,000 bacteria per cubic centimeter, 10 per cent. contained over 5,000,000 bacteria per cubic centimeter, 15 per cent. contained under 100,000 bacteria per cubic centimeter.

The next year 287 samples averaged 275,000 bacteria per cubic centimeter, 9 per cent. contained over 5,000,000 bacteria per cubic centimeter, 28 per cent. contained under 100,000 bacteria per cubic centimeter.

The next year, in 1902, 531 samples averaged 215,000 bacteria per cubic centimeter, 6 per cent. contained over 5,000,000 bacteria per cubic centimeter, 34 per cent. under 100,000 bacteria per cubic centimeter.

In 1903, to October 1st, 389 samples averaged 209,000 bacteria per cubic centimeter, 4 per cent. contained over 5,000,000 bacteria per cubic centimeter, and 33 per cent. under 100,000 bacteria per cubic centimeter.

Now what has been the effect of that work? It has been this: Six years ago the percentage of deaths in children under five years of age in the city of Rochester, for a period of six years (I say six years because we have been working at this scheme for six years) the percentage of deaths of children under five years of age in the city of Rochester is 28 and a fraction per cent. For the six years during which we have been working at this scheme our percentage of deaths under five years of age has been 19.5 per cent.; and that I believe is the lowest rate of the kind in the State of New York or any other State that I know anything about.

I recall the fact that Dr. Lederle spoke of Long Island City, or the borough of Queens, in which borough of Queens they have between 35 per cent. and 40 per cent. of their deaths in children under five years of age. I think at the present time they have a larger death rate in that borough——

Dr. Lederle (interrupting)—That is where we had to put the cows in the pound and charge them $3 a day.

Dr. Goler—For the past six years we have had another plan in Rochester for still further purifying the milk supply.

Six years ago we had a health commission who gave me an appropriation of $400 to start milk stations under the control of trained nurses. They gave it very grudgingly and we started a little station over in one of the most populous districts of the city and we put out this milk—at that time it was pasteurized milk, with nursing bottles of the Siebert type, numbered, so that all the mother had to do was to slip a nipple over the nursing bottle and the child waited, and the nurse, in the absence of any definite direction from the physician, directed the quantity that the particular child was to receive.

Our success was so great that we established another station two or three weeks afterward. Prior to that time the deaths in children under five years of age had averaged for many years 112 in each July, 98 in each August. That year the deaths fell to 50 in July and 62 or 63 in August—practically split in half.

We have continued that scheme on a little larger basis for six years. We have four stations each year and a model dairy on the milk farm, and four stations in different parts of the city, each in charge of a trained nurse, and the refrigerator on the farm is in charge of a trained nurse; and we believe that our results, costing less than $5,000 in six years, have warranted that expenditure.

In the six years in which that scheme has been in operation, with a better and more efficient milk inspection, and with the standard of dirt value for the milk, our deaths in children under one year of age have been one thousand less in numbers than they were in the prior six years; our deaths in children between one and five years of age have been six hundred less, in round numbers—1,620 less in these six years than in the prior six years. That is, there has been a difference, in round numbers, between 2,800 deaths in children under one year of age, and between 1,600 deaths and approximately 1,000 deaths. Those are the relative relations of the figures for the six years.

It seems to me that such a scheme as we have outlined, and to which prior to this time no publicity has been given outside of the city of Rochester, is worthy of introduction into other cities.

I read a paper next month in New York city, outlining still further this plan which we are putting into operation. Of course we are a small city and can work a great deal better, to better advantage, in a smaller city than Dr. Lederle can with his great tenement house districts and the many obstacles which he has thrown in his way. Notwithstanding the difficulties that he must have, along with Dr. Greene, in getting money from the board of aldermen, there is a very easy way of dealing with it. In Rochester I do it in this way: If the board of aldermen won't give me money for purposes of that kind, I say, "Very well, there are several gentlemen who stand ready to give me several thousand dollars for the purpose; if you are not willing to give it, I will go outside and get private citizens to give it;" and they have always come down. [Great applause.]

Dr. Clark (of Utica)—Shortly after I had charge of health affairs in Utica my milk inspectors told me that the cans in which the milkmen brought their milk to town, large numbers of them, were very much battered and dented and soldered, with the result of collecting large quantities of dirt. We have a regulation against dirty cans, but it is a very difficult thing to take these up to police court, it takes a lot of time, and I finally told my men to go out in couples and mark sample bottles in the night. Every dirty can they found which had not been properly cleaned, I told them to take their knives and scrape it and put the scrapings into these little bottles (half ounce) and give the milkman one and keep one themselves, and then take that can.

containing anywhere from ten to twenty gallons of milk, and dump it into the sewer. It was a very striking lesson to the milkmen. They would stand a suit in court and arrest very easily, but to see their milk deliberately go into the sewer was a very strong lesson to them. I think my men emptied six cans the first morning. The second morning, before it had got thoroughly noised around, they emptied four, and the third morning they reported to me that they could not empty any; they told me that these cans all looked as if they had been newly nickel plated. They had scraped them and washed them and made them shine before they started out from their homes, and since then our milk cans, as far as their appearance is concerned, are very much cleaner.

As to the quality of milk, three or four years ago they brought in a report of 16 specimens of milk examined for the quantity of fat alone and they averaged from five and a half to three, the greater number of them running between three and three and a half, and every one of the milkmen in my neighborhood understand how to use the separator and they can remove fifty per cent. of their milk by this separator and then pull their milk up to New York State standard.

Dr. Hix (of Binghamton)—Gentlemen of the convention, one of my friends, disappointed like myself to-night, made the remark that possibly it was providential that some part of the railroad track had been washed out, and I think for one that it is providential, that we have listened to a paper that has paid us liberally for the disappointment in not being able to reach our homes down in the southern tier.

Now in Binghamton we do not, so far as numbers are concerned, amount to very much, in comparison with the municipalities represented here by the men who have spoken upon this subject, but human nature is the same in Binghamton that it is in Buffalo and in other places in the State of New York. We have felt that our mission was one of education, and for five years I have talked and as it were tried to hammer into the brains of our people the necessity of pure milk. I have reason to believe that some good has come from this, and with your permission I will express to you some things that we have done in the last year.

One thing I wish to say: We have been handicapped in our efforts to do good because of politics being introduced into the manipulations of our board and the civil service of our city, giving us a milk inspector who did not appreciate the responsibility at all of his position and did not try to do his duty; and consequently we had to do away with his services, thus hampering us and leaving us without a proper systematic inspection of our milk. But during the year we have held a meeting calculated to educate the producer and to educate the consumer at the same time. That meeting was addressed by a representative from the Agricultural Department of the State and by a scientist from Cornell University.

I believe this meeting resulted in good and I think it would be of use all over the State. I wish that I might have a little conference with Dr. Lederle in regard to this matter. He receives milk from our locality and the Five County Milk Association often meets in the city of Binghamton.

I wish we could again have a meeting of this nature at our place and have it addressed by Dr. Lederle and other competent men.

Now this is diverging, and talking a little on Dr. Greene's subject of fumigation. We didn't ask the common council whether we should fumigate or not. We said to the people, "You shall not be released from quarantine until a proper fumigation of your premises under the supervision of our sanitary inspector has been had."

I want to tell you what the result is there. Of course it is easier in Binghamton than in Buffalo, but the results are such that the people demanded that the fumigation take place and the neighborhood would not be in any way satisfied if it was not properly looked after by our department. But the subject of pure milk and pure water and pure food is what is interesting us. [Applause.]

Dr. Lewis—Is there any further discussion?

Dr. Lederle—I was going to say that I have here a set of the blanks that we use in our milk wagons and I would be very glad after the session if any of the gentlemen are interested in this subject to see them and quote from them. I would be very glad to explain them. They are hardly of enough interest to show the whole audience.

Dr. Lewis—This communication which we have had the pleasure of receiving from Dr. Lederle is of such transcendent importance in my estimation and in yours, I believe, that I stand ready to receive a motion of thanks from this conference to Dr. Lederle for his paper.

Dr. Greene—I will be very glad to make that motion.

(The motion was seconded and carried unanimously.)

Dr. Lewis—Dr. Lederle, the thanks of the conference are voted to you.

The next paper will be on "Water Purification," by Mr. Allen Hazen, of New York city.

WATER PURIFICATION

BY MR. ALLEN HAZEN, OF NEW YORK CITY

MR. CHAIRMAN AND GENTLEMEN—There are many methods of securing pure water supplies for cities, but the most important of those methods fall naturally into three classes. The first of these classes includes the effort to get waters from unpolluted sources, naturally pure waters. Some of the cities on the Great Lakes are particularly fortunate in that respect. Other cities, where sparsely settled districts are available, have built large reservoirs to store up the floods of the winter and spring and make them available for the summer. Most of the larger New England cities are supplied in this way. New York city is so supplied, for the most part, and many of our other cities, but in the inland cities and in the middle and southern States supplies of this kind are difficult or impractical.

The second class includes all the supplies drawn from underground sources. Supplies of this kind are naturally filtrated by their passage through the soil, and waters of this class are very generally of great purity.

It is fair to say that by far the largest number of public water supplies in use in this country are of this class, and it is also true that for the most part the number of villages and small cities and a number of large cities that are naturally supplied in this way is limited.

The third method of securing pure supplies is by means of artificial purification. This branch of the subject is much newer than the others. It has developed rapidly in the last ten years. and it is bound to develop still more rapidly in the future.

You have visited this afternoon the filters which purify most of the water used by the city of Albany. That part of Albany's supply not so purified comes from lakes and reservoirs back in the hills, creeks and reservoirs which constitute the original supply of Albany and which were of very much better quality than the river water which is filtered.

I thought that you would be interested, perhaps. to see some sections and plans of these filters and some views of them during construction, which would show to you more clearly than an inspection of the finished work, how they were put together and just how they worked, and I have included in the series the views of a number of other purification plants which I thought would interest you.

VIEW NO. 1

We have here a general plan of the purification plant, the Hudson river on the right, the pumping station on the upper right, pumping water to the sedimentation basin, which is open to the sky, and through which the water passes, depositing the heavier and grosser part of its impurities, and from which it flows to eight covered filters on the left, where it passes through a sand layer and is connected by a natural drainage system and flows out through regulating chambers to a small pure water reservoir at the end of the court and from thence through a forty-eight inch pipe flows under the Erie canal, down to a pumping station in the heart of the city, which pumps the filtered water to the respective distributing reservoirs which supply the city.

VIEW No. 2

We have here a section of the embankment between the river and the sedimentation basin. The thirty-six inch pipe deeply buried under the embankment brings the river water and flows out through the outlet which you see, falling over the top, becoming a little aerated and falling into the sedimentation basin on the left.

VIEW No. 3

We have here a section through one of the filters, beginning at the top with two feet of soil, then the masonry arches which support it and form the cover for the filters, then the water, and underneath that the sand, four feet of water, and four feet of sand, and one foot of gravel below the sand, and drains, with open joints in this gravel, which take out the filtered water and carry it to the large pipe underneath, marked thirty-eight inch vitrified pipe, which carries it out to the regulating chamber.

VIEW No. 4

A larger section of one side of the filter, showing the construction of the outside wall and the arrangement of the gravel and under drains.

The gravel is kept away from the walls, because it was the experience of the older filters that water found its way down sometimes between the sand and the walls without purification. The sand does not always fit closely to a vertical wall, but it is sure to fit with the utmost tightness with twenty-four inches of tile on which it rests between the outer wall and the gravel; so that in case some raw water filters down through the wall, it has still got to go through that forty-eight inches of sand, which gives it a good purification.

The rain which falls on the soil above is collected and brought down through a drain in the center and is discharged into the water above the filter.

VIEW No. 5

Another section, showing the central underdrain beneath the floor of the filter and the way in which the lateral drains in the gravel are connected with it.

I might say that the covers which are used here are used commonly on such filters only in cold climates. In warmer climates the filters can just as well be opened to the sky, but in severe climates like Albany it is necessary to cover them as a precaution from frost.

VIEW NO. 6

A photograph of the construction of the bottom of one of the filters. The site on which the filters were built was a marsh. It was flooded by the river at each considerable rise, and it was so wet between floods that it had to be drained.

Our first operation in building the filters was to drain it and afterwards excavate it to an even grade and then the floor was put down in the shape of blocks of concrete. These were put down every other block first, between wooden forms, and then the intermediate spaces were filled. The floor forms an inverted arch, so that the weight of the roof is distributed over the floor, with the view of avoiding unequal settlement.

After the floors were finished brick piers were built on each of the bases which afterwards served to carry the roof. The walls of the filters are also shown.

VIEW NO. 7

Here we have a birdseye view of several of the filters under construction. On the right you see the completed piers. Then there is a cross wall between two filters. Farther to the left are the rafters which carried the wooden roof on which the masonry roof was built, and farther to the left the carpenter work was complete, and at the extreme left the masonry is being placed on top of the wood. The woodwork is temporary and comes out afterwards.

VIEW NO. 8

This shows better the placing of the concrete on top of the wooden forms.

VIEW NO. 9

Here the masonry has been completed and the forms have been struck, as we call it—that is, the supports have been knocked out and fallen down.

VIEW NO. 10

This was a later filter built, and the forms were liable to go to pieces and form a mass of débris, you see. This gives a very good idea of the covering of the brick piers which support it.

VIEW NO. 11

When the wood and débris are cleaned out, we have the masonry complete, clean and ready to receive the filtering material, which is the filter proper.

VIEW NO. 12

Here we have one of the lateral drains placed, and the gravel about it, and in the background the sand is being drawn in and placed in the three layers. The three layers are all of the same grade, and it is placed in three layers simply as a precaution, so that if sand of the coarser grain should happen to be at any point, that would not extend from top to bottom, and would only constitute at most one-third of the thickness of the layer.

You can see on the top the exact shape of the boards of the temporary support. Each line between two boards is represented in the concrete which formed a little ridge.

VIEW NO. 13

Here we have a corner, with the lower and coarser layer of the gravel, and in the corner one of the entrances where the raw water comes in. The sand has to go to the top of the circular brick structure, which you see, and the water goes almost to the top of the piers, and the float which you see will rise on the stem until it hits a nut at the top, and then shuts off, automatically, the water coming in, acting in this way on the same principle as the ball and cock on the tank of a water-closet, but on a very much larger scale.

VIEW NO. 14

Another view, showing the sand in this case piled up to a much greater depth. The sand was dumped through holes in the roof by teams which drove over the top.

VIEW No. 15

Here the sand has been smoothed and the filter is completed and all ready for service.

VIEW No. 16

Now we have the water brought in and the filter is in service.

After the filter has been in service for about a month, the top of the sand is covered with a deposit of slime, matter which has been strained out of the water filter, and this deposit makes the sand very dirty, indeed, to a depth perhaps of a quarter of an inch, and less dirty to a somewhat greater depth. At the end of about a month this deposit has become so thick that water will no longer pass in sufficient quantities. The water is then drawn off from the filter and men go into the sand and scrape up this deposit, exposing the sand below, which is comparatively clean and ready for use again.

VIEW No. 17

Some of this dirty matter is here piled up, ready to be taken out.

VIEW No. 18

Another view, showing the piles and also the wheelbarrows which are used for taking the sand out and the shovels used in handling it.

In some of the plants built since the Albany plant mechanical means for removing this sand has been provided, but up to the construction of this work the best method known was to wheel it out in wheelbarrows.

VIEW No. 19

A view in the court outside, showing wheelbarrow loads of dirty sand being brought up and piled up ready for washing.

This procedure is somewhat changed now. At present this sand is washed as it is brought out, and is never piled up as is shown here.

VIEW No. 20

Here we have the sand washer which we saw at work this afternoon. The dirty sand is shoveled into it or dumped into it as it comes from the filter, and goes through a series of hoppers. In each hopper it is mixed with clean water which enters it under pressure and which lifts the sand continuously from the bottom of the hopper and throws it into the next hopper, while the dirty water from the preceding washing falls off at one side back to the river. The washed sand is piled up in the court and from time to time this sand is replaced in the filters, so that the amount of sand in them is kept substantially at the original level.

The filters have theoretically four feet of sand. If they are scraped half an inch deep once a month for two years, the sand will be reduced in thickness to three feet, and at the end of that time a thicker layer than usual is taken off and then the sand is loosened up by forking and washed sand is replaced to the original depth. A little of the sand is lost in washing, but it is an extremely small fraction of the whole amount. Since the plant has been in use, four years, no new sand has been supplied, and there has been no depreciable shrinkage in the stock of sand.

VIEW No. 21

To go back a little to the sedimentation basin, which serves for the preliminary treatment of the water, we have here a view showing how this bottom was made. It is a concrete floor, put in in alternating strips, and cut up into grooves with open joints.

On the left you see the filters well advanced in construction.

After these floors were finished and after the concrete was laid the joints were filled with melted asphalt, making them water tight.

A view of the pumping station is shown on the left.

VIEW No. 22

The floor of this sedimentation basin is built with slats in all directions, as shown in the foreground, so that once a year the basin can be drawn off and cleaned.

VIEW No. 23

A view showing the construction of the sides of the sedimentation basin. It is built of heavy limestone blocks, as we were afraid that the action of the frost on the concrete, with the varying levels, would disintegrate it. The concrete therefore was stopped a few feet above the bottom, and the upper part was built of stone.

VIEW NO. 24

A view of the sedimentation basin completed and in service. In the background you see the Hudson river, from which the raw water is taken. The pumping station serves to lift the water and discharge it through these eleven outlets which you see, and these outlets are perforated, so that the water is very much cut up, and has a chance to become as thoroughly aerated as possible. It also serves to distribute the incoming water very well along one side of the basin and the outlets are correspondingly distributed along the opposite side.

VIEW NO. 25

A larger view of one of these outlets.

VIEW NO. 26

A view from a higher point, showing the channels of the Hudson river.

VIEW NO. 27

A view of the cleaning of the sedimentation basin after nearly a year's use. The mud about the outlets, one of which is here shown, deposited to a depth of a foot or more, while the mud at the remote parts of the basin was only a fraction of an inch in thickness.

VIEW NO. 28

Another view of the cleaning, showing the forcing forward of the mud to the swamp, with the aid of water. The water is admitted at various places, as you see in the background, which forms currents going over the sloping surface, so that the deposit is very easily pushed forward to the waste. The washing is put back into the river.

VIEW NO. 29

A view of the pumping station, not in service, with everything quiet.

VIEW NO. 30

A view of one of the regulator houses, or rather two of them. One of these houses is provided for each filter, and it is provided with devices for showing the loss of head—that is, the pressure required to force the water through the sand; also with devices for measuring the quantity of water passing.

Incidentally I may state that since the filter plant has been in operation, it has been known how much water was pumped a great deal more accurately than it was ever known before.

VIEW NO. 31

A view of the laboratory building. This was built as a part of the plant, because it was regarded that an examination of the water before and after treatment was one of the essentials for the successful operation of the plant, and in this laboratory Mr. Wachter, the chemist and biologist, determines the constituents and color of the water, before and after treatment, and at frequent intervals makes a chemical analysis, and makes examinations of the raw water at the inlet, after settling, and the effluent from each filter and of the mixed effluent from all the filters, every day, and he also examines occasionally samples of the water from the old gravity sources of supply which still furnish some of the water used by the city.

You can see in this picture faintly in the background a part of the city of Troy, which is the most important contributor of pollution to the water of the Hudson river at the intake.

VIEW NO. 32

We have here the inlet for raw water, the point where raw water enters one of the filters of the East London Water Company, the company supplying a population of considerably over one million people in London.

This filter, as you see, is not covered. It is open to the sky, the winters in London being much less severe than they are in Albany. This filter, I might say, has been in use for at least forty years and is still in use to-day.

VIEW No. 33

Another view of the same filter, which shows very nicely the operation of scraping. You can see very easily where the sand has been scraped and the dirty matter piled up ready for removal, and the part that is yet to be scraped.

These filters take water from the river Lee, which is a quite highly polluted source, and supply from it drinking water of most excellent quality.

VIEW No. 34

Another view of the same filters, showing the division wall, part embankment and part wall between two filters. The filter on the right is full of water and in service, while the one on the left is drawn off for the purpose of being cleaned.

VIEW No. 35

A view of a regulator house of one of the filters at Bremen, Germany. This regulator house is designed so that the loss of head and the rate of filtration are indicated on two dials placed outside the filter house. This was a very clever idea of the engineer, whose thought was that the filtration attendants' clothes and shoes were not altogether too clean and it was better for them to know what the head was and what rate they were using without entering the filter house. So he keeps his house locked up and only admits people under special conditions.

VIEW No. 36

This is a view of the underdrainage system of one of the Bremen filters, and I show it as a representative of a very old filter.

At the time I took this photograph, which was ten years ago, this filter had been in service some thirty years, and the foundation was rather bad; the walls had developed cracks, and it was unsatisfactory, and Mr. Girson, the engineer, was ripping the filter to pieces and was going to reconstruct it. It had been in service thirty years entirely without repairs, and this photograph shows the original construction, which of course was not repeated in the reconstructed filter. The house in the background contains the sand-washing apparatus.

VIEW NO. 37

A view of the sedimentation basin at Bremen, Germany, and in the background the water-tower which serves to equalize the pressure for the city. The country is quite flat and to fill the reservoir on the hill was impossible, and this very heavy masonry structure was built, which contains a water tank of the whole size of the building, perhaps twenty feet deep at the top. The pumps which lift the water are placed directly underneath it. It is a very interesting and remarkable piece of engineering, and something entirely different from anything existing in this country. The towers of the cathedral are shown on the right.

VIEW NO. 38

A view of some filters which supply some of the suburbs of the city of Paris.

These are quite modern in construction, of concrete and steel and, as you see, open to the sky. These filters have played a tremendously important part in the sanitary department of Paris. Paris, you know, has prided itself for many years on its spring water supplies, but those spring water supplies, some of which were brought a hundred miles, were not sufficient to meet all the needs of the city. They have had to use river water at times to supplement it, and they have had typhoid fever which they tell us came from the river water, which was mixed with the spring water. But about ten years ago they got enough spring water by the building of new aqueducts to supply the whole city, and the typhoid rate fell very much, but not so low as some other cities.

Meanwhile the suburbs of Paris, which had grown rapidly and were refused the spring water, because Paris had not enough for the suburbs, and the suburbs could not build these long aqueducts, so they built these filters, and they supplied themselves with this polluted Seine water, and it created almost a public scandal in Paris when it was found that these suburbs, with their miserable filthy Seine water had a much lower typhoid rate than Paris even with spring water. In the last three or four years they have been studying their spring waters, and find they come from cavities in limestone rock, and that they are polluted and bring typhoid germs to Paris. What they are going to do about it I don't know.

VIEW No. 39

A view of a very old filter at Antwerp. The raw water is brought in through the canal on the right, and the filters are shown on the left.

The foundations for these filters were very soft, and they have settled. You are able to see some cracks in the masonry from that. But notwithstanding that fact they have given excellent service.

VIEW No. 40

A view of the sand washer at Antwerp. This is a similar, but very much cruder, system than that used in other cities.

VIEW No. 41

I have here a view of a couple of small filters built for the Pennsylvania State Lunatic Hospital at Harrisburg.

The raw water is taken from a small brook back of the filters just this side of the hill. It is brought through a house, an inlet at one side, and taken through one or both of the two filters, and the effluent is taken through the house at the other side, and then to a covered water tower, through which it is pumped to the tanks supplying the city.

VIEW No. 42

I have here a view of the plant of the East Jersey filtering plant at Little Falls, New Jersey, which supplies filtered water to Paterson, Passaic and a number of other cities.

This plant is built on quite different lines from the Albany plant. The Albany filters operate at a slow head, and the discharge of water through sand, the sand containing a great many living organisms is depended upon to purify the water.

In this Little Falls plant the water is also passed through sand, but at a rate above forty times as great as that used at Albany, and this rate is so great that, if other conditions were not introduced, no substantial purification would be effected by it.

In this case the water is treated with sulphate of alumina, and this drives the impurities of the water into the aggregate in which they are removed much more easily than in separate particles; so that even with this high rate of purification a substantial purification is obtained.

VIEW No. 43

This view shows the plant in course of construction and shows the pure-water reservoir, which in this case is immediately below the filters. The reservoir is shown with walls about it, and the filters are to be placed on top. The large pipe which you see is the pipe which brings in the water to be filtered.

VIEW No. 44

This section shows the general arrangement of the filters. The pure-water reservoir is below, and the filters above on each side of the central gallery, while the house covers the ends of the filters. The other parts of the filters are covered by masonry roofing.

VIEW No. 45

An interior view of the house over the filters, showing the tables from which the operation of the filters is controlled. There are a great many ingenious and satisfactory devices for controlling this operation, which reflect a great deal of credit upon the designer, Mr. George W. Fuller, and also upon the contractors.

VIEW No. 46

A view of the pumping station which pumps the water from this plant to the various cities supplied by it.

VIEW No. 47

I have here a diagram showing some of the conditions upon the Merrimac river, which I prepared a few years ago, from 1850 to 1900, based upon the census report and other corresponding data.

Looking at the upper part of the diagram, the upper line, the whole right of the shaded area shows the whole population dependent upon the water of the river above Lawrence. You can see how it has increased from decade to decade. The upper part with lighter shading is the rural population. Below you see the line which covers the urban population. The entire increase in population has been urban. The rural population has somewhat decreased.

Up to 1870 the urban population was practically unsewered. In the decade beginning with 1880 sewers were constructed in all the larger cities on the watershed, and we have a line starting at nothing in 1870, rising rapidly to 1880 and then following the conditions of the urban population until 1900, when practically the whole urban population was sewered. Then there is a little subdivision in that little triangle that takes in all the population which is served by sewerage and purification works, and the lower part with the vertical shading represents urban population connected with sewers going directly into the river without treatment.

In the lower part of the diagram is a line showing the estimated relative amount of pollution. This line is based upon a number of suppositions which are approximate, but which gives a very good idea of the relative pollution of the river at different times, and the fact that the estimates are somewhat nearly correct is borne out by a line showing the free ammonia in the raw water, which of course are the results of a large number of samples each year by boards of health.

This diagram shows that about 1870, when the large cities on the river put in public water supplies, and used the river water, the river water was, from our present standpoint, in its original unpolluted condition, and when those supplies were put in, in every case, there was very satisfactory improvement in the health of the cities, with the use of that water; and I show that because at that time the introduction of public water supplies from a river with as dense a population as the Merrimac was a tremendous step in advance from a sanitary standpoint in the sanitary condition of those cities—a step in advance perhaps as great as the purification or substitution of other supplies for these same supplies a generation later; and when we think of the men who were instrumental in bringing about the introduction of those supplies, there is often a disposition to criticise them for not anticipating these conditions; but I think we ought to be very careful in that and think of the conditions as they were at that time. The rate at which the curve is rising is a very suggestive one, and it suggests that the methods which we are using now may perhaps be regarded in a very different light and may prove inadequate in the course of another generation.

VIEW No. 48

I have here a diagram of the typhoid death-rate of a number of communities, and under each a line showing the character of the water supply.

At the top is Newark. Newark used to get its water from the Passaic river, which was one of the most highly polluted streams below Paterson used for public water supply in the United States. The time when this water was given up and when the Pequack water, which is water from a comparatively unpolluted source, was taken, is shown at the end of the white line and beginning of the black line, and the drop of the typhoid rate you can see coincided substantially with the change of water supply.

Below I have New York (that is, Manhattan and the Bronx) supplied with Croton water, which is shown light, and indicates that it is comparatively good water, and the death rate from typhoid has been steady and moderate.

Next I have a typhoid rate for the whole State of Massachusetts, and the line underneath is a divided line, mostly white, but with a thin strip of black, gradually decreasing, as the water supplies of the State which may be regarded as bad have been eliminated.

Next I have Lowell, Mass., which took its water from the Merrimac river at a point a little above the point shown by the last diagram, and which some years ago they substituted for this ground water. The change was a gradual one. It took the city about three years to make the change, and so instead of cutting it off sharp, I have shown the gradual change. The typhoid rate with the Merrimac river water is sufficiently impressive, and the low rate since is equally impressive.

Next I have Lawrence, taking its water from the Merrimac below Lowell, and introducing a filter plant in 1893, indicated by a break in the black line. The drop in the typhoid rate is sufficiently impressive here also.

You will notice the last year but one, there was a little rise in the typhoid rate at Lawrence, but that happened when a man who thought he understood filtering tried to do some stunts with it.

You will also notice in Newark a temporary rise in the last year but one. That happened when, in cold weather, they used more water or wasted more water, than the pipe would carry. and for one week they started up the old pumps and pumped the old water from the Passaic river.

Below Lawrence I have Albany, taking its water from the Hudson river, and with the typhoid rate as shown going almost to the end, only a fraction of the year with the filters shown on this diagram. I can state, however, that the rate in Albany since that time has been as low as other cities.

At the bottom I have Pittsburg, taking its water from the polluted Allegheny river. It still uses it and still has the same rate.

This diagram is impressive as showing the very marked reduction in the typhoid rates with the substitution of the pure water supplies, and it is also impressive as showing that in the three cases, with water from the practically unpolluted sources, with ground water and with filtered river water, from very highly polluted sources, the resulting death rates from typhoid fever were substantially the same.

I thank you, gentlemen, for your attention.

[Great applause.]

Dr. Lewis—We will be pleased to hear from Dr. Craig, in discussing this paper.

Dr. Craig—This is rather a sudden call. I suppose you have called upon me with reference to the water supply in the city of Albany. I can not say anything more than to indorse the statements which have been made by Mr. Hazen.

The diagram shows well the fall in the typhoid rate after the introduction of the filtered water supply. If I had any idea that I was to be called upon to-night, I should have been very glad to have brought with me some facts which would have been very instructive.

The filtered water was turned on in Albany, I think, on the 8th or 9th of November, 1899, and immediately there was a marked reduction in the number of cases of typhoid. That diminution has practically gone on from that time to the present.

There is a rise in the typhoid rate in Albany in August and in September and through a part of October; so that the figures are deceptive. Apparently there is something wrong with the filter plant, by reason of which the death rate rises during those months.

I have introduced in the city a system of collecting information, so that in all cases of contagious diseases and typhoid fever reported we endeavor to ascertain certain things. In regard to the typhoid, we endeavor to find out the source of drinking water and whether the patient has been away from the city for three weeks at any time, during the three weeks preceding the illness. In that way we have ascertained that a great number of these cases which occur in August and September and part of October are to be classed as vacation typhoid. They are certainly brought into the city from the various health resorts.

But then there is another factor in the problem here which apparently makes the rate higher than it ought to be, and that is, our intimate relations with the surrounding cities and towns, Rensselaer, immediately across the river; Troy, above; Menands. Cohoes, all have a more or less polluted water supply. Communication is very easy with all these places, and many of our typhoid cases are brought into the city from neighboring cities and villages.

Then we have a number of cases which occur from boatmen and ice-handlers. Quite a number of our cases are cases that arise in this way; so that the diagram shown by Mr. Hazen is very instructive. We wish we could have had a more diminished death rate in Albany, but it is higher than it ought to be for these reasons.

I don't know that I can say anything more.

Prof. Landreth—This is a very interesting address by Mr. Hazen, on the immense importance of water purification. It forms a very proper sequel to the interesting inspection this afternoon of the Albany filtration plant.

I think we are indebted to Mr. Hazen for this pleasure and I think that he is really entitled to an expression of our gratification in the form of a word of thanks.

I move you, Mr. Commissioner, that a vote of thanks be extended to Mr. Hazen for his admirable presentation of this subject.

(The motion was seconded and put and unanimously carried.)

Dr. Lewis—This conference is unanimous in extending its thanks to you, Mr. Hazen. Is there any further discussion?

It has occurred to me that while we have been trying to succeed in decreasing the death rate from diphtheria, and have made a great many advances along the sanitary line in a great many diseases, yet we still hold that a city that has twenty deaths to a hundred thousand population a year is all right. That proposition is wrong from my standpoint, when you come to the cities of the old world and find that they have a death rate of only ten or fifteen per hundred thousand per year, while in this country it is from twenty to thirty (Buffalo has twenty most of the time, last year it had thirty, New York has twenty), when we take London and Berlin and Brussels, and several others that only have about ten per hundred thousand, it is a matter for us to think about.

A Member—I would like to ask Dr. Craig whether his present cases of typhoid are referred back to the towns where they originated. He says he found a great many cases of typhoid fever now in Albany which originated outside of the city. Are they referred back in the statements of the death rate here?

Dr. Craig—It is almost impossible to get everything of that kind on record. Many times we are unable to tell with any considerable accuracy where the typhoid was contracted. I suppose you mean the general result of the investigation?

Dr. Greene—You said, I think, that many of the cases of typhoid fever which occurred in the city came from outside of the city, presumably residents of other towns in the neighborhood of Albany. I wondered if a man coming to a hospital from Greenbush, for example, and dying in Albany would be recorded as a death on your statistics, as though he were a resident of Albany, or whether that death would be referred back to the records of Greenbush.

Dr. Craig—We would not refer them back to Greenbush.

Dr. Greene—There is a statement by Dr. Craig about vacation typhoid, as he terms it. Albany is directly on the way to the Adirondacks and depends on the Adirondacks for a large portion of its vacation field. The Adirondacks, it is known, I suppose, have almost the highest death-rate of any of the five districts of the State, I think possibly excluding the Hudson Valley district, and that largely accounts, not only for the high rates attending the return from vacations, but it also should receive the attention of the members from the Adirondack district to discover, if possible, the cause for the exceedingly bad record, and ultimately change the bad reputation which that territory enjoys on this score of typhoid death-rate.

Dr. Curtis—There is one significant fact that comes to my mind, in connection with what Dr. Craig says, and I would like to ask Mr. Hazen if he has observed it—that cities supplied from navigable and much polluted streams have their high death rate in the winter. I notice that to be the case in Lawrence. It was frequently remarked in taking the monthly poll here in Albany, quite uniformly, and we know that typhoid fever increases in

August and runs on through one or two succeeding months. That is the high point always for rural mortality. I happen to know that Albany had a death rate never below fifty during the fifteen years prior to the introduction of this filtration plant—from that up to one hundred and twenty. I don't think it has had since that a death rate of over fifteen to twenty-five or twenty-six, during the four years that have elapsed since then, and the remarkable fact was the diminution from the very moment of its establishment, the very first month, five or six or seven days showed a decrease, and it seemed to be so extraordinary as to be worth taking into account; and it has never gone up since. Furthermore it has lost its former winter high rate.

Dr. Lewis—It is almost with regret, gentlemen, that I arise to tell you that the session of this Third Annual Conference is about to close.

I have nothing but satisfaction personally, and in saying that, I speak also for the State Department, that you have honored us with your presence and attendance, with your suggestions and advice; and I believe more firmly than ever that it is time exceedingly well spent that we spend in these annual conferences; so that if nothing unforeseen shall happen we shall invite you here again next year, and expect that the same gentlemen or gentlemen equally distinguished in their various fields of special work will be present here to help us make the session both interesting and profitable.

It is a good thing, in my estimation, for us to come together, not only for these purposes, but for the social purpose of meeting each other and looking into each other's eyes and shaking each other's hands, and knowing and feeling and realizing that each and every one of us is engaged in the same work of public sanitation for the benefit of the public, whose servants we are.

I thank you, gentlemen, and now declare this convention closed.

[Great applause.]

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